وزارة التعليم العالي والبحث العلمي

جهاز الإشراف والتقويم العلمي

دائرة ضمان الجودة والاعتماد الأكاديمي

استمارة وصف البرنامج الأكاديمي للكليات والمعاهد
للعام الدراسي 2024-2023

الجامعة : ذي قار

الكلية/ المعهد: كلية الهندسة

القسم العلمي :- الميكانيك

تاريخ ملء الملف : ٢٤/٢/٢٠٢٤

التوقيع :

اسم رئيس القسم : الأستاذ المساعد الدكتور أحمد جاسم شكارة

التاريخ ٢٤/٢/٢٠٢٤

التوقيع :

اسم المعاون العلمي الأستاذ الدكتور مشتاق اسماعيل حسن معاون العميد العلمي

التاريخ : ٢٤/٢/٢٠٢٤

دقق الملف من قبل

شعبة ضمان الجودة والأداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي:

التاريخ :- 25/5/2024

التوقيع:-

مصادقة السيد العميد

قسم الهندسة الميكانيكية – عام

متطلبات مسار بولونيا

جامعة ذي قار	University of Thi-Qar
مستوى البكالوريوس (الدورة الأولى) - بكالوريوس مع مرتبة الشرف في الهندسة الميكانيكية	Bachelor's level (First cycle) - Honors Bachelor degree in Mechanical Engineering
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة اوربية - كل وحدة اوربية = ٢٥ ساعة	Four years (Eight semesters) - 240 ECTS credits - 1 ECTS = 25hr
المنهاج الدراسي للعام ٢٠٢٣-٢٠٢٤	Program Curriculum (2023 - 2024)

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
	B	7.00	175	52	123	3		2			2	4	English	التفاضل والتكامل	Calculus	ER 101	1		
	S	2.00	50	17	33	3					1	1	Arabic	مهارات اللغة العربية	Arabic language skills	UR 101	2		
	C	7.00	175	81	94	4				2	1	3	English	مبادئ عمليات الإنتاج	Principle of production processes	ME101	3		
	B	4.00	100	36	64	4				2		2	English	اساسيات علم الحاسوب	Principles of computer science	ER 102	4	One	
	B	4.00	100	67	33	3						2	English	فيزياء	Physics	ER 103	5		
	B	6.00	150	72	78	3		1			1	3	English	ميكانيك هندسي (الستاتك)	Engineering Mechanics (Static)	Me 102	6		
		30.00	750	325	425	20	0	3	0	4	5	15	Total						

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	UGI
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
	C	5.00	125	62	63	3		1				3	English	ميكانيك الهندسي (الداينمك)	Engineering mechanics (Dynamics)	Me 103	1		
	B	7.00	175	67	108	3				4	1	2	English	الرسم الهندسي	Engineering drawing	ER 104	2		
	C	6.00	150	86	64	4				2		2	English	مبادئ الهندسة الكهربائية	Princples of Electrical Engineering	ME104	3		
	S	2.00	50	17	33	3					1	1	English	اساسيات اللغة الإنكليزية	Basics of english language	UR 102	4	Two	
	B	4.00	100	67	33	3						2	English	كيمياء	Chemistry	ER 105	5		
	C	6.00	150	86	64	4				2		2	English	خواص المواد	Properties of Materials	ME105	6		
		30.00	750	385	365	20	0	1	0	8	2	12	Total						

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
ER 101	B	7.00	175	52	123	3		2			2	4	English	الرياضيات التطبيقية	Applied Mathematics	ER 201	1		
	C	6.00	150	71	79	4		1		2		2	English	مقاومة المواد	Strength of materials	ME201	2		
	C	6.00	150	71	79	4		1		2		2	English	ديناميك الحرارة	Thermodynamics	ME202	3		
	C	5.00	125	61	64	4				2		2	English	الموائع الساكنة	Static Fluid	ME203	4	Three	
	S	2.00	50	17	33	3					1	1	Arabic	حقوق الانسان والديمقراطية	Human right and democracy	UR 201	5		
ER 102	B	4.00	100	36	64	4				2		2	English	برمجة الحاسوب	Computer programming	ER 202	6		
		30.00	750	308	442	22	0	4	0	8	3	13	Total						

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	UGII
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
ME201	C	6.00	150	71	79	4		1		2		2	English	تحليل الاجهادات	Stresses analysis	ME204	1		
ME202	C	6.00	150	71	79	4		1		2		2	English	تطبيقات ديناميك الحرارة	Thermodynamics applications	ME205	2		
	C	7.00	175	82	93	3				3		3	English	الرسم الميكانيكي	Mechanical Drawing	ME206	3		
ME203	C	6.00	150	71	79	4		1		2		2	English	الموائع المتحركة وتطبيقاتها	Fluid Dynamics with applications	ME207	4	Four	
	C	5.00	125	61	64	4				2		2	English	هندسة المعادن	Engineering of Metallurgy	ME208	5		
																	6		
		30.00	750	356	394	19	0	3	0	11	0	11	Total						

Prerequisite Module(s) Code	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	8.00	200	77	123	3		2			2	4	English	التحليلات الهندسية والعددية	Engineering and numerical Analyses	ME301	1		
	C	4.00	100	36	64	4				2		2	English	انتقال الحرارة بالتوصيل	Conduction Heat Transfer	ME302	2		
ME101	C	6.00	150	71	79	4				2		3	English	عمليات التصنيع	Manufacturing Processes	ME303	3		
	C	4.00	100	36	64	4				2		2	English	اساسيات مكائن الاحتراق الداخلي	Fundamentals of Internal Combustion Engines	ME304	4	Five	
	C	4.00	100	36	64	4				2		2	English	ديناميك الغازات	Gas dynamics	ME305	5		
	C	4.00	100	36	64	4				2		2	English	نظرية المكائن	Theory of Machine	ME306	6		
		30.00	750	292	458	23	0	2	0	10	2	15	Total						

Prerequisite Module(s) Code	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
ME302	C	5.00	125	61	64	4				2		2	English	انتقال الحرارة بالحمل	Convection Heat Transfer	ME307	1		UGIII
ME104	C	5.00	125	61	64	4				2		2	English	المكائن الكهربائية	Electrical Machinery	ME308	2		
	C	6.00	150	56	94	4				2	2	2	English	التصميم والتصنيع باستخدام الحاسوب	Computer Aided Design (CAD/CAM)	ME309	3		
ME304	C	6.00	150	56	94	4		1	1	2		2	English	تصميم مكائن الاحتراق الداخلي	Design of Internal Combustion Engines	ME312	4	Six	
	C	6.00	150	71	79	4		1		2		2	English	التوربينات	Turbo machinery	ME310	5		
	S	2.00	50	17	33	3					1	1	English	مهارات اللغة الإنكليزية	English language skills	UR 301	6		
		30.00	750	322	428	23	0	2	1	10	3	11	Total	التدريب الصيفي	Summer training	ME311			

Prerequisite Module(s) Code	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	5.00	125	62	63	3						4	English	الاهتزازات	Mechanical Vibrations	ME401	1		
	C	5.00	125	61	64	4				2		2	English	التكييف	Air Conditioning	ME402	2		
ME105	C	4.00	100	52	48	3						3	English	هندسة المواد	Engineering Materials	ME403	3		
	C	6.00	150	72	78	3		1				4	English	تصميم المكائن	Machine Design	ME404	4	Seven	
	C	4.00	100	52	48	3						3	English	الهندسة الصناعية والسيطرة النوعية	Industrial Engineering and quality control	ME405	5		
	C	6.00	150	102	48	3				2		1	English	المشروع الهندسي	Engineering project	ME406	6		
		30.0	750	401	349	19	0	1	0	4	0	17	Total						

Prerequisite Module(s) Code	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
ME406	C	6.00	150	102	48	3				2		1	English	المشروع الهندسي	Engineering project	ME407	1		UGIV
ME402	C	5.00	125	61	64	4				2		2	English	التثليج	Refrigeration	ME408	2		
ME404	C	6.00	150	72	78	3		1				4	English	تصميم أنظمة المكائن	Design of Machine Systems	ME409	3		
	C	7.00	175	82	93	3			2			4	English	محطات قدرة	Power plants	ME410	4	Eight	
	C	4.00	100	36	64	4				2		2	English	السيطرة والقياسات	Control and measurements	ME411	5		
	S	2.00	50	17	33	3					1	1	English	اخلاقيات المهنة	Ethics	ER 401	6		
		30.0	750	370	380	20	0	1	2	6	1	14	Total						
Must be 240 ECTS		240.0	6000	2759	3241	166	0	17	3	61	16	108	Total						

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

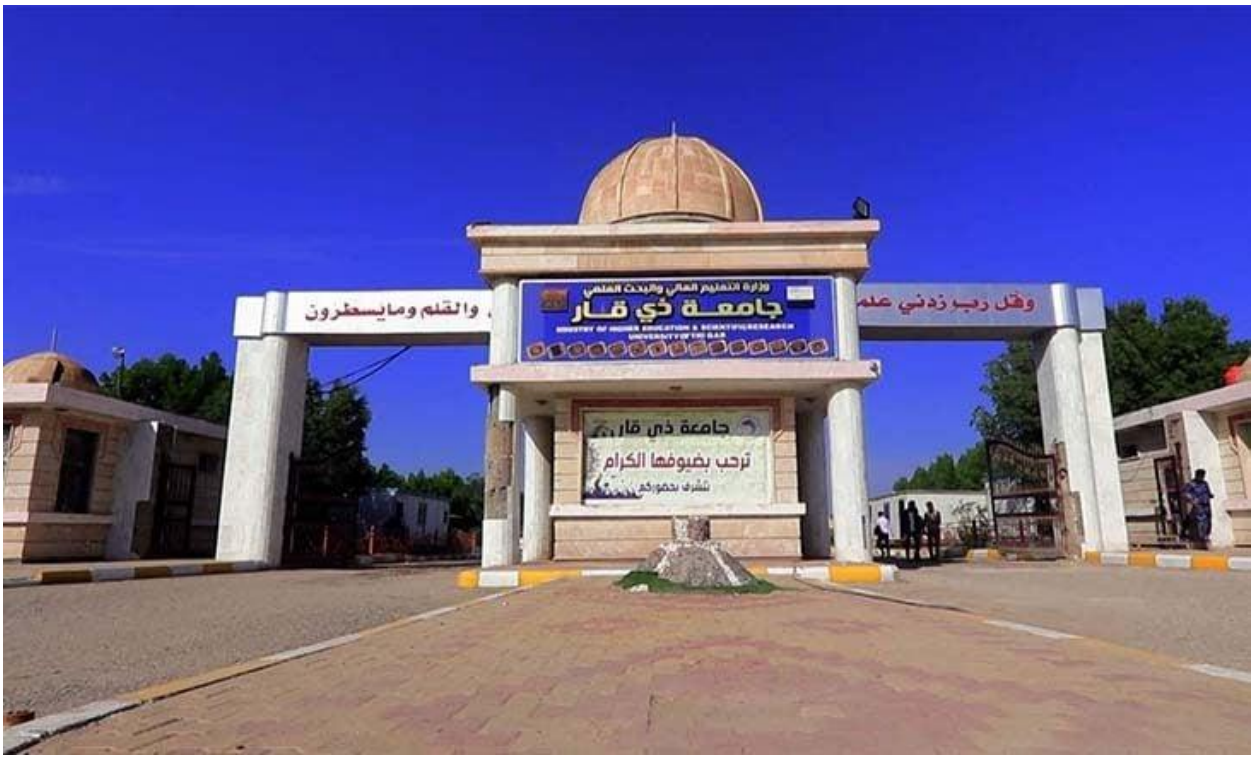
Student Workload	**SWL:**	Basic learning activities	**B**	**Module type**	Class Lecture	**CL**
Structured SWL	**SSWL:**	Core learning activity	**C**		Laboratory	**Lab**
Unstructured SWL	**USSWL:**	Suport or related learning activity	**S**		Practical Training	**Pr**
		Elective learning activity	**E**		Tutorial	**Tut**
					Online lectu	**Lect**
					Seminar	**Sem n**

Structured SWL (hr/w) type

UNIVERSITY of Thi-Qar
جامعة ذي قار

Bachelor of Science Honours (B.Sc. Honours) – Mechanical Engineering

بكالوريوس هندسة ميكانيكية



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1. Mission & Vision Statement

Vision Statement

Our vision for mechanical engineering is to be at the forefront of innovation, driving sustainable advancements that shape the future of our world. We strive to create transformative solutions that optimize efficiency, enhance quality of life, and promote a greener and more resilient planet. Through interdisciplinary collaboration and a commitment to excellence, we aim to revolutionize industries, propel technological breakthroughs, and empower future generations of engineers to solve complex global challenges. By leveraging cutting-edge technologies and embracing a holistic approach, we envision a future where mechanical engineering leads the way in creating a harmonious balance between human progress, environmental stewardship, and social well-being. Our vision is to be the driving force behind a sustainable and prosperous world, where mechanical engineering serves as a catalyst for positive change.

Mission Statement

Our mission is to provide exceptional education, research, and practical experiences in mechanical engineering to empower our students with the knowledge, skills, and ethical values necessary for successful careers and contributions to society. We are committed to fostering a dynamic learning environment that nurtures curiosity, critical thinking, and problem-solving abilities.

Through our rigorous curriculum, we aim to instill a strong foundation in core mechanical engineering principles and practices while promoting innovation, creativity, and entrepreneurship. We strive to equip our graduates with the ability to adapt to emerging technologies and to meet the evolving needs of the industry.

In collaboration with industry partners and research institutions, we actively engage in cutting-edge research and development activities that address significant societal challenges. We aspire to be a leading center for research excellence in mechanical engineering, contributing to advancements in energy, manufacturing, transportation, and sustainable design.

Furthermore, we are dedicated to serving the community through outreach programs, knowledge transfer initiatives, and collaboration with local industries. We aim to foster a spirit of social responsibility and leadership in our students, encouraging them to actively contribute to the development and progress of Iraq.

Overall, our mission is to cultivate competent, innovative, and ethical mechanical engineers who can make significant contributions to the advancement of technology, industry, and society, both locally and globally.

2. Program Specification

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

Mechanical engineering is an incredibly diverse and dynamic field, and at Thi-Qar University, we are proud to offer a comprehensive program that covers a wide range of subjects within this discipline. With a dedicated faculty and state-of-the-art facilities, we are well-equipped to provide a quality education in mechanical engineering.

Our program places a strong emphasis on understanding the intricacies of mechanical systems and their interrelationships. From the smallest components such as gears and mechanisms to the larger systems like engines and robotics, we explore the entirety of mechanical engineering. We believe in a holistic approach that considers the whole system and its integration with other disciplines.

The popularity of our program stems from its broad scope. Some students are drawn to the breadth of mechanical engineering, appreciating the opportunity to gain knowledge and skills in various areas. For others, it serves as a pathway to specialization, allowing them to focus on specific aspects of mechanical engineering that align with their interests and career goals. At the end of the first year, all students have the option to transfer to our specialized degrees in areas such as automotive engineering, energy systems, or manufacturing. Our program provides a solid foundation in the fundamental principles of mechanical engineering. Students learn about mechanics, thermodynamics, materials science, and other core subjects that form the backbone of the field. This knowledge is then applied to practical situations through laboratory sessions, design projects, and hands-on experiences.

Furthermore, we encourage our students to engage in interdisciplinary collaborations and explore the connections between mechanical engineering and other fields. By

understanding the broader context, such as the impact of mechanical systems on the environment, sustainability, and societal needs, our graduates are equipped to make meaningful contributions to their communities and address global challenges.At Thi-Qar University, we foster a supportive and engaging learning environment. Our faculty members are dedicated to providing quality education through interactive lectures, practical demonstrations, and research opportunities. We strive to create an atmosphere where students can develop critical thinking, problem-solving, and teamwork skills that are essential for success in the field of mechanical engineering.

Overall, our mechanical engineering program at Thi-Qar University aims to produce well-rounded graduates who possess a deep understanding of the subject, practical skills, and a passion for innovation. We are committed to preparing our students to become future leaders, capable of driving advancements, improving efficiency, and contributing to the development and progress of society through their knowledge and expertise in mechanical engineering.Mechanical Engineering at Thi-Qar University follows a structured program that progressively builds students' knowledge and skills in the field.

Level 1 serves as an introduction to the fundamentals of mechanical engineering, providing a strong foundation for students to progress to higher levels and specialize within the program. At Level 2, students delve into program-specific core topics that prepare them for research-led subject specialist modules at Levels 3 and 4. This progression ensures that graduates of the program have a comprehensive understanding of mechanical engineering, aligning with the University and College Mission statements to appreciate how research informs teaching.

The research ethos is instilled in students from the beginning through practicals, which are integrated within lecture modules or taught in dedicated practical modules. Research seminars and tutorials further foster a research-oriented mindset. Additionally, a compulsory field course is offered at Level 1, providing hands-on experience and knowledge that is essential for progression to Level 2. More field courses are available at Levels 2, 3, and

4, allowing students to explore specific areas of interest. At Level 4, all students undertake an independent research project, which can be a library or data analysis project, or a field or laboratory-based project, depending on their preferences and the available resources.

To provide continuous guidance and support, academic tutorials are held at Levels 1 and 2 with the same tutor, who also acts as the personal tutor for consistency. These tutorials include workshops that teach essential skills, such as library use and presentation skills. Students have opportunities to practice these skills in a subject-specific context through assessed exercises, such as essays and talks.

Thi-Qar University also offers international years and industrial placements to provide students with valuable experiences and exposure to different cultures and industry practices. Individual needs and preferences are discussed with the appropriate tutor to ensure that students can take advantage of these opportunities whenever possible.

Overall, the Mechanical Engineering program at Thi-Qar University combines a structured curriculum, research-oriented practical experiences, and personalized guidance to prepare students for successful careers in mechanical engineering. By fostering a strong research ethos, offering diverse module choices, and providing opportunities for international and industrial experiences, we strive to develop well-rounded graduates who are equipped to excel in their field and contribute to the advancement of mechanical engineering.

3. Program Goals

1. Graduation of qualified engineers in the specialization of mechanical engineering with the ability to distinguish, analyze, find appropriate solutions to the problems of application and deal with modern technologies with great skill.
2. The department aims to provide the country with mechanical engineers who contribute to the development of energy sectors, industrial sectors, projects management and solving the engineering problems associated with the development of industrial and technical fields.

3. Develop scientific research field and scientific and engineering expertise.
4. Developing the community through the training and rehabilitation of engineers and employees of the departments of the province through the establishment of training courses.
5. Contribute to the dissemination of scientific and engineering knowledge in the community with the establishment of seminars and scientific conferences that address the topics that concern the development of society.
6. Preparing qualified graduates to enroll in graduate programs within and outside the country and work in research centers.

4. Student Learning Outcomes

The program has graduate outcomes that prepare graduates to attain the program educational objectives few years after graduation. The graduate outcomes stated in this report were set according to the Iraqi Engineering Graduate's Attributes in terms of knowledge, skills, abilities and attitudes. Societal and environmental aspects have been also considered under the title of ethics. Students must be directed towards enhancing the quality of human life and maintaining sustainability principles, cultural heritage and humanitarian and patriotism values.

Outcome 1

An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.

Outcome 2

An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process.

Outcome 3

An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.

Outcome 4

An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels.

Outcome 5

An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations.

Outcome 6

An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly.

Outcome 7

An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

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

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

Calculation of the Grade Point Average (GPA)

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

   GPA of a 4-year B.Sc. degrees:

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

7. Curriculum/Modules

Semester 1 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ER 101	Calculus	123	52	7.00	B	
UR 101	Arabic language skills	33	17	2.00	S	
ME101	Principle of production processes	94	81	7.00	C	
ER 102	Principles of computer science	64	36	4.00	B	
ER 103	Physics	33	67	4.00	B	
Me 102	Engineering Mechanics (Static)	78	72	6.00	B	

Semester 2 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Me 103	Engineering mechanics (Dynamics)	63	62	5.00	C	
ER 104	Engineering drawing	108	67	7.00	B	
ME104	Principles of Electrical Engineering	64	86	6.00	C	
UR 102	Basics of english language	33	17	2.00	S	
ER 105	Chemistry	33	67	4.00	B	
ME105	Properties of Materials	64	86	6.00	C	

Semester 3 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ER 201	Applied Mathematics	123	52	7.00	B	ER 101
ME201	Strength of materials	79	71	6.00	C	
ME202	Thermodynamics	79	71	6.00	C	

ME203	Static Fluid	64	61	5.00	C	
UR 201	Human right and democracy	33	17	2.00	S	
ER 202	Computer programming	64	36	4.00	B	ER 102

Semester 4 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME204	Stresses analysis	79	71	6.00	C	ME201
ME205	Thermodynamics applications	79	71	6.00	C	ME202
ME206	Mechanical Drawing	93	82	7.00	C	
ME207	Fluid Dynamics with applications	79	71	6.00	C	ME203
ME208	Engineering of Metallurgy	64	61	5.00	C	
						ME201

Semester 5 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request

ME301	Engineering and numerical Analyses	123	77	8.00	C	
ME302	Conduction Heat Transfer	64	36	4.00	C	
ME303	Manufacturing Processes	79	71	6.00	C	ME101
ME304	Fundamentals of Internal Combustion Engines	79	36	4.00	C	
ME305	Gas dynamics	64	36	4.00	C	
ME306	Theory of Machine	64	36	4.00	C	

Semester 6 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME307	Convection Heat Transfer	64	61	5.00	C	ME302
ME308	Electrical Machinery	64	61	5.00	C	ME104
ME309	Computer Aided Design (CAD/CAM)	94	56	6.00	C	
ME312	Design of Internal Combustion Engines	94	56	6.00	C	ME304

ME310	Turbo machinery	79	71	6.00	C	
UR 301	English language skills	33	17	2.00	S	ME302

Semester 7 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME401	Mechanical Vibrations	63	62	5.00	C	
ME402	Air Conditioning	64	61	5.00	C	
ME403	Engineering Materials	48	52	4.00	C	ME105
ME404	Machine Design	78	72	6.00	C	
ME405	Industrial Engineering and quality control	48	52	4.00	C	
ME406	Engineering project	48	102	6.00	C	

Semester 8 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME407	Engineering project	48	102	6.00	C	ME406

ME408	Refrigeration	64	61	5.00	C	ME402
ME409	Design of Machine Systems	78	72	6.00	C	ME404
ME410	Power plants	93	82	7.00	C	
ME411	Control and measurements	64	36	4.00	C	
ER 401	Ethics	33	17	2.00	S	ME406

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UNIVERSITY of Thi-Qar

جامعة ذي قار

Bachelor of Science Honours (B.Sc. Honours) – Mechanical Engineering

بكالوريوس علوم - هندسة ميكانيكية

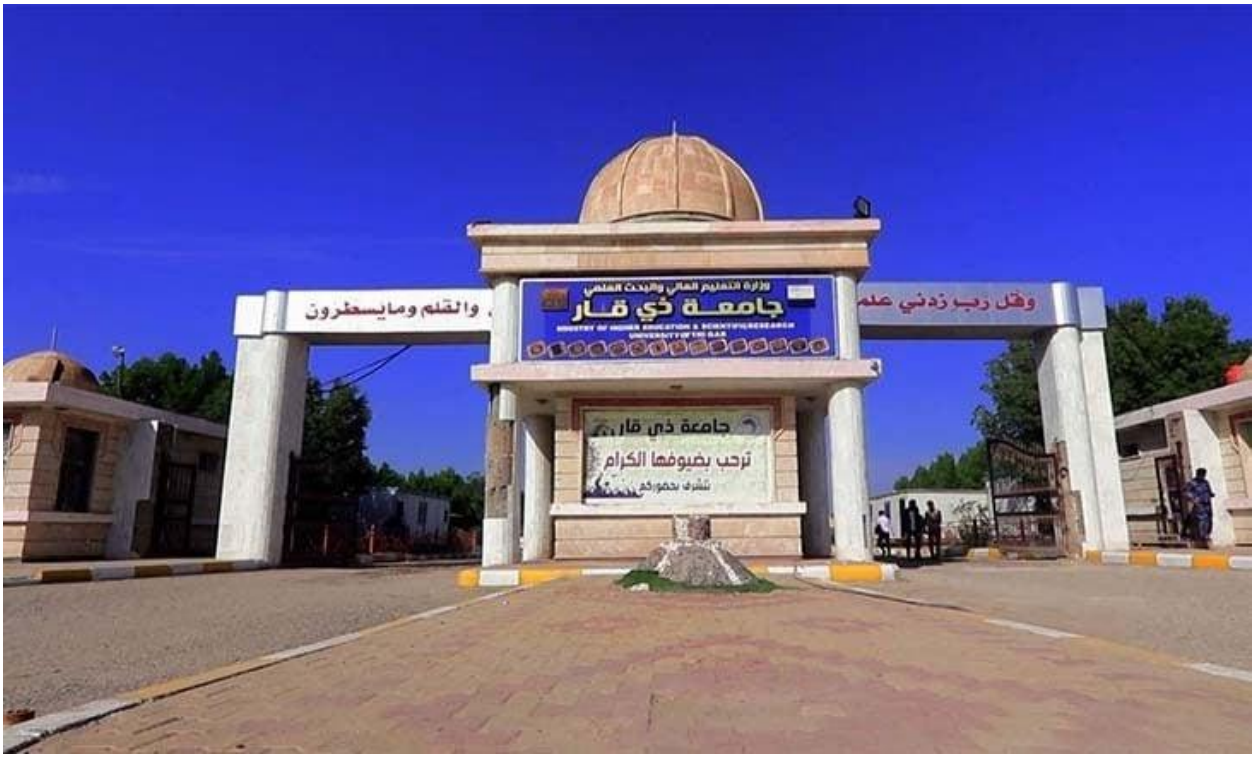

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of Electrical Engineering to gain the Bachelor of Science degree. The program delivers (48) with 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) مادة دراسية مع ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

1

Code	Course/Module Title	ECTS	Semester
ER 101	Calculus	7.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	52	123
Description			
The Calculus for Mechanical Engineering module provides students with a solid foundation			

in calculus and its practical applications within mechanical engineering. This module covers fundamental concepts such as limits, rates of change, and optimization through differentiation. Integration techniques for areas, volumes, and centroids are explored. Additionally, students learn how to model and analyze dynamic systems using ordinary differential equations. Through practical exercises and real-world case studies, students develop critical thinking skills and the ability to apply calculus principles in solving engineering problems. This module prepares students to tackle advanced topics in mechanical engineering, enabling them to excel in dynamics, thermodynamics, fluid mechanics, and control systems.

2

Code	Course/Module Title	ECTS	Semester
UR 101	Arabic language skills	2.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33
Description			
The Arabic Language Skills for Mechanical Engineering module enhances the language proficiency of mechanical engineering students in Arabic. This module focuses on developing reading, writing, listening, and speaking skills tailored to the field. Students learn technical vocabulary, grammar, and terminology relevant to mechanical engineering. They practice reading and comprehending technical documents, research papers, and engineering manuals in Arabic. Writing skills are honed through composing reports, summaries, and technical descriptions. Listening comprehension is enhanced through audiovisual materials and lectures in Arabic. Speaking skills are developed through discussions, presentations, and role-plays. By the module's end, students will have improved their Arabic language proficiency, enabling effective communication in engineering contexts and access to Arabic resources, research, and professional networks, fostering global engineering perspectives.			

3

Code	Course/Module Title	ECTS	Semester
ME101	Principle of production processes	7.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	81	94
Description			
The Principles of Production Processes module equips mechanical engineering students with a deep understanding of the foundational principles governing various production processes. This module delves into the methodologies, technologies, and strategies employed in manufacturing and production within the mechanical engineering field.Students will explore essential concepts such as production planning, process optimization, quality control, and resource management. They will gain insights into diverse manufacturing techniques, including machining, casting, welding, and additive manufacturing, examining their applications, strengths, and limitations.Through practical exercises and case studies, students will develop skills in process design, analysis, and enhancement. They will also acquire knowledge of production systems encompassing automation, robotics, and computer-integrated manufacturing.			

4

Code	Course/Module Title	ECTS	Semester
ER 102	Principles of computer science	4.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64

Description

The Principles of Computer Science module introduces mechanical engineering students to the foundational principles and concepts of computer science. This module explores the application of computer science in solving engineering problems, enhancing efficiency, and enabling innovation within the mechanical engineering field.Students will learn essential programming concepts, algorithms, and data structures. They will develop skills in programming languages commonly used in mechanical engineering, such as MATLAB and Python. The module covers topics including control structures, functions, arrays, and object-oriented programming.Through practical exercises and projects, students will gain hands-on experience in applying computer science principles to solve mechanical engineering challenges. They will learn to analyze data, perform simulations, and develop computational models.By the end of the Principles of Computer Science module, students will have a solid understanding of computer science fundamentals and their relevance in mechanical engineering. They will possess the skills to design and implement computational solutions, leveraging programming and data analysis techniques. This knowledge will empower them to tackle complex engineering problems, optimize processes, and contribute to cutting-edge advancements in the field.

5

Code	Course/Module Title	ECTS	Semester
ER 103	Physics	4.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	67	33

Description

The Physics for Mechanical Engineering module provides students with a comprehensive understanding of the fundamental principles of physics and their applications in mechanical engineering. This module covers key topics including mechanics, thermodynamics, fluids, and electromagnetism.Students will delve into the principles of classical mechanics, studying concepts such as motion, forces, energy, and momentum. They will explore thermodynamics and gain knowledge of the laws governing energy transfer, heat, and work in mechanical systems. The module will also cover fluid mechanics, including fluid dynamics and the behavior of gases and liquids.Additionally, students will study electromagnetism, learning about electric and magnetic fields, circuits, and electromagnetic waves. They will develop a strong foundation in the principles of physics through theoretical analysis and practical experiments.By the end of the Physics for Mechanical Engineering module, students will have a deep understanding of the laws and principles governing the behavior of mechanical systems. They will be able to apply their knowledge to analyze and design mechanical components and systems, and make informed decisions regarding material selection, energy efficiency, and system optimization. This module prepares students for advanced topics in mechanical engineering, such as dynamics, vibrations, control systems, and renewable energy technologies.

6

Code	Course/Module Title	ECTS	Semester
Me 102	Engineering Mechanics (Static)	6.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	72	78
Description			
The Engineering Mechanics (Static) module provides mechanical engineering students with a solid understanding of the principles of statics. This module focuses on the analysis and design of mechanical systems at rest or in equilibrium. Students learn the concepts of forces, moments, and structural stability.Through the module, students study vector algebra, free-body diagrams, and equilibrium conditions to analyze and solve engineering problems involving trusses, frames, beams, and machines. They develop skills in determining support reactions, calculating internal forces, and assessing the stability of mechanical components.By completing the Engineering Mechanics (Static) module, students gain the necessary foundation to analyze and design mechanical systems that maintain equilibrium, setting the stage for advanced topics in structural analysis and machine design within mechanical engineering.			

7

Code	Course/Module Title	ECTS	Semester
Me 103	Engineering mechanics (Dynamics)	5.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	62	63
Description			

The Engineering Mechanics (Dynamics) module provides mechanical engineering students with a comprehensive understanding of the principles of dynamics. This module focuses on the analysis and design of mechanical systems in motion. Students learn about the kinematics and kinetics of particles and rigid bodies.Through the module, students study concepts such as velocity, acceleration, Newton's laws of motion, and energy methods to analyze the motion of mechanical systems. They explore topics including impulse and momentum, work and energy, and vibrations.By completing the Engineering Mechanics (Dynamics) module, students gain the necessary foundation to analyze and design mechanical systems in dynamic motion. This prepares them for advanced topics in robotics, vehicle dynamics, machinery design, and other areas within mechanical engineering.

8

Code	Course/Module Title	ECTS	Semester
ER 104	Engineering drawing	7.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	5	67	108

Description

The Engineering Drawing module is designed to equip mechanical engineering students with the fundamental skills necessary to create and interpret technical drawings. This module focuses on the principles, techniques, and standards involved in generating accurate and detailed engineering drawings.Students will learn the fundamentals of orthographic projection, isometric projection, and sectioning to represent three-dimensional objects on two-dimensional paper. They will study various drawing conventions, including dimensioning, tolerancing, and symbols used in mechanical engineering.Through practical exercises and hands-on projects, students will develop proficiency in creating engineering drawings for components, assemblies, and machine parts. They will learn to communicate design specifications, manufacturing instructions, and tolerances effectively.By the end of the Engineering Drawing module, students will possess the necessary skills to read and create engineering drawings, which are essential for mechanical engineering design, manufacturing, and documentation. They will be able to accurately communicate their design ideas, collaborate with other engineers, and understand technical drawings in various mechanical engineering applications.

Code	Course/Module Title	ECTS	Semester
ME104	Principles of Electrical Engineering	6.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	86	64

Description

The Principles of Electrical Engineering module provides mechanical engineering students with a foundational understanding of electrical principles and their applications within the field. This module focuses on essential concepts such as circuit analysis, electrical components, and electromechanical systems.Students will study fundamental electrical laws, including Ohm's law and Kirchhoff's laws, and learn how to analyze and design basic electrical circuits. They will gain knowledge of electrical components such as resistors, capacitors, and inductors, and explore their behavior in circuits.Through practical exercises and laboratory work, students will gain hands-on experience with electrical measurements, circuit simulations, and the operation of electromechanical devices. They will learn to apply electrical principles to solve problems related to motor control, sensors, and power distribution.By the end of the Principles of Electrical Engineering module, students will have a solid understanding of electrical principles and their application to mechanical systems. They will be equipped to integrate electrical components and systems into mechanical designs, contributing to the development of advanced technologies and the efficient operation of mechanical engineering systems.

10

Code	Course/Module Title	ECTS	Semester
UR 102	Basics of english language	2.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33

Description

The Basics of English Language module is designed to provide mechanical engineering students with the foundational skills necessary to communicate effectively in English. This module focuses on developing essential language skills, including reading, writing, listening, and speaking, tailored specifically to the context of mechanical engineering.Students will learn basic grammar, vocabulary, and sentence structure to enhance their reading and writing abilities. They will practice listening comprehension through engineering-related audio materials, lectures, and presentations. Speaking skills will be honed through discussions, presentations, and role-plays, focusing on engineering topics.By the end of the Basics of English Language module, students will have improved their English language proficiency, enabling them to communicate confidently and fluently in professional settings within the mechanical engineering industry. They will be better equipped to collaborate with international colleagues, access English-language resources, and present their ideas effectively, enhancing their career prospects and facilitating their participation in a global engineering community.

Code	Course/Module Title	ECTS	Semester
ER 105	Chemistry	4.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	67	33

Description

The Chemistry module for Mechanical Engineering provides students with a foundational understanding of the principles and applications of chemistry within the field. This module focuses on essential concepts such as atomic structure, chemical bonding, thermodynamics, and materials science.Students will study the properties and behavior of matter, including gases, liquids, and solids, as well as the principles of chemical reactions and equilibrium. They will explore the role of chemistry in corrosion, material selection, and environmental impact.Through practical exercises and laboratory work, students will gain hands-on experience with chemical analysis techniques and material characterization. They will learn to apply chemical principles to solve engineering problems related to materials selection, surface treatments, and environmental sustainability.By the end of the Chemistry module, students will have a solid understanding of the chemical principles relevant to mechanical engineering. They will be equipped to make informed decisions regarding material choices, process optimization, and environmental considerations, contributing to the development of sustainable and innovative mechanical engineering solutions.

12

Code	Course/Module Title	ECTS	Semester
ME105	Properties of Materials	6.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	86	64

Description

The Properties of Materials module provides mechanical engineering students with a comprehensive understanding of the properties and behavior of materials commonly used in the field. This module focuses on the relationship between material composition, structure, processing, and performance.Students will study the mechanical, thermal, electrical, and chemical properties of metals, polymers, ceramics, and composites. They will learn about material characterization techniques, such as microscopy and spectroscopy, to analyze and evaluate material properties.Through practical exercises and laboratory work, students will gain hands-on experience in testing and analyzing the mechanical and physical properties of materials. They will learn to interpret material property data and make informed decisions regarding material selection for specific engineering applications.By the end of the Properties of Materials module, students will have a solid understanding of the relationship between material properties and performance. They will be equipped to select appropriate materials for mechanical design, assess material behavior under different conditions, and optimize material selection to meet engineering requirements. This knowledge will enable them to make informed decisions and contribute effectively to the design and development of innovative mechanical engineering solutions.

13

Code	Course/Module Title	ECTS	Semester
ER 201	Applied Mathematics	7.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	52	123

Description

The Applied Mathematics module is designed to equip mechanical engineering students with the mathematical tools and techniques necessary to solve engineering problems encountered in the field. This module focuses on the application of mathematical concepts in areas such as mechanics, thermodynamics, fluid dynamics, and control systems.Students will study topics including calculus, linear algebra, differential equations, and numerical methods. They will learn to apply mathematical modeling and analysis techniques to solve engineering problems, optimize designs, and predict system behavior.Through practical exercises and computational simulations, students will gain hands-on experience in applying mathematical principles to real-world mechanical engineering scenarios.By the end of the Applied Mathematics module, students will have developed the proficiency to analyze and solve complex engineering problems using mathematical methods. They will be able to apply mathematical models and techniques to optimize mechanical designs, predict system performance, and make informed engineering.

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Code	Course/Module Title	ECTS	Semester
ME201	Strength of materials	6.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79
Description			
The Strength of Materials module provides mechanical engineering students with a comprehensive understanding of the behavior and strength of materials under various loads and conditions. This module focuses on analyzing and predicting the mechanical response of materials to external forces and stresses.Students will study topics such as stress and strain analysis, material properties, and failure criteria. They will learn about different types of loading, including axial, bending, and torsional loads, and their effects on material behavior.Through practical exercises and laboratory work, students will gain hands-on experience in testing and analyzing material properties, as well as predicting structural performance.By the end of the Strength of Materials module, students will have a solid understanding of the principles and techniques used to analyze the strength and structural integrity of mechanical components and systems. They will be equipped to make informed design decisions, assess material suitability, and ensure the safety and reliability of mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME202	Thermodynamics	6.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79

Description

The Thermodynamics module provides mechanical engineering students with a comprehensive understanding of the principles and applications of thermodynamics. This module focuses on the study of energy transfer, heat, and work in mechanical systems.Students will explore topics including the laws of thermodynamics, properties of substances, energy analysis, and thermodynamic cycles. They will learn to analyze and calculate properties such as temperature, pressure, and entropy, and understand their impact on system performance.Through practical exercises and simulations, students will gain hands-on experience in analyzing thermodynamic processes and evaluating system efficiency.By the end of the Thermodynamics module, students will have a solid understanding of thermodynamic principles and their application in mechanical engineering. They will be equipped to analyze and optimize energy conversion systems, design heat transfer equipment, and contribute to sustainable and efficient engineering solutions.

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Code	Course/Module Title	ECTS	Semester
ME203	Static Fluid	5.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
The Static Fluids module provides mechanical engineering students with a comprehensive understanding of the behavior and properties of static fluids. This module focuses on the principles and applications of fluid statics.Students will study topics such as pressure, hydrostatic forces, buoyancy, and fluid equilibrium. They will explore the behavior of fluids at rest, analyzing fluid pressure distribution and its effects on submerged objects and fluid containers.Through practical exercises and laboratory work, students will gain hands-on experience in measuring pressure, calculating forces, and analyzing fluid statics scenarios.By the end of the Static Fluids module, students will have a solid understanding of the principles governing the behavior of static fluids. They will be equipped to analyze and design fluid systems, such as tanks, dams, and hydraulic systems, ensuring structural stability and efficient operation within mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
UR 201	Human right and democracy	2.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33

Description

The Human Rights and Democracy module introduces mechanical engineering students to the fundamental concepts and principles of human rights and democracy. This module focuses on raising awareness and fostering a sense of responsibility in future engineers towards social justice, inclusivity, and ethical practices.Students will study topics such as universal human rights, democratic principles, social equality, and ethical decision-making. They will explore the intersection between engineering and human rights, considering the impact of engineering projects on individuals, communities, and the environment.Through case studies and discussions, students will examine real-world engineering challenges, addressing issues related to safety, sustainability, and the rights of workers and communities affected by engineering projects.By the end of the Human Rights and Democracy module, students will have a broader perspective on their role as engineers in society. They will be equipped to approach their work with a deeper understanding of the social and ethical implications, striving to promote human rights, social justice, and democratic values in their professional practice.

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Code	Course/Module Title	ECTS	Semester
ER 202	Computer programming	4.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
The Computer Programming module introduces mechanical engineering students to the foundations of computer programming and its applications within the field. This module focuses on developing programming skills and problem-solving techniques using a language commonly used in engineering applications.Students will learn programming concepts such as variables, loops, conditionals, functions, and data structures. They will gain proficiency in writing code to solve engineering problems, perform data analysis, and automate repetitive tasks.Through practical exercises and projects, students will apply programming principles to simulate mechanical systems, analyze experimental data, and control devices.By the end of the Computer Programming module, students will possess the skills to develop software solutions for engineering challenges. They will be able to write, debug, and optimize code, enhancing their ability to design innovative mechanical systems, perform simulations, and automate processes within the field of mechanical engineering.			

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Code	Course/Module Title	ECTS	Semester
ME204	Stresses analysis	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79

Description
This course on stresses analysis in mechanical engineering provides a comprehensive understanding of stress-related phenomena in materials and structures. Students will explore fundamental concepts like stress, strain, and material properties, along with various types of stresses and measurement techniques. The course covers stress concentration, failure criteria, and methods for stress analysis, including analytical and numerical approaches. Practical applications in structural design and load-bearing systems will be discussed. By the end of the course, students will have the necessary knowledge and skills to analyze and predict the behavior of materials under different loading conditions, making them proficient in stress analysis within mechanical engineering.

Code	Course/Module Title	ECTS	Semester
ME205	Thermodynamics applications	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79

Description

This course explores the practical applications of thermodynamics in the field of mechanical engineering. Students will delve into the fundamental principles of thermodynamics, including energy, entropy, and heat transfer. The focus will be on applying these principles to real-world scenarios encountered in mechanical engineering, such as power generation, refrigeration, and heat exchangers. Through a combination of theoretical discussions and problem-solving exercises, students will gain a comprehensive understanding of thermodynamic cycles, thermodynamic properties of substances, and energy conversion processes. By the end of the course, students will be equipped with the knowledge and skills to analyze and optimize thermodynamic systems within mechanical engineering applications.

Code	Course/Module Title	ECTS	Semester
ME206	Mechanical Drawing	7.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	82	93
Description			
This course on mechanical drawing in mechanical engineering focuses on developing essential skills for creating detailed and accurate technical drawings. Students will learn to communicate design ideas effectively through the use of engineering drawings, including orthographic projections, sections, and auxiliary views. The course covers topics such as dimensioning, tolerancing, and geometric dimensioning and tolerancing (GD&T). Students will gain proficiency in using drafting tools and computer-aided design (CAD) software to create 2D and 3D drawings. Emphasis will be placed on understanding industry standards and conventions for mechanical drawings. By the end of the course, students will be equipped with the necessary skills to produce professional-grade mechanical drawings for engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME207	Fluid Dynamics with applications	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79
Description			
This course on fluid dynamics with applications in mechanical engineering provides a comprehensive understanding of fluid behavior and its practical implications. Students will explore the fundamental principles of fluid mechanics, including fluid properties, conservation laws, and flow characteristics. The course covers topics such as fluid statics, flow measurements, and fluid dynamics analysis techniques. Emphasis will be placed on applying fluid dynamics principles to real-world engineering applications, such as pumps, turbines, and pipe networks. Students will gain hands-on experience through laboratory experiments and computational fluid dynamics (CFD) simulations. By the end of the course, students will have the knowledge and skills to analyze and design fluid systems, making them proficient in fluid dynamics within mechanical engineering.			

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Code	Course/Module Title	ECTS	Semester
ME208	Engineering of Metallurgy	5.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on the engineering of metallurgy provides a comprehensive understanding of the properties and behavior of metals in mechanical engineering applications. Students will explore the principles of metallurgy, including crystal structure, phase transformations, and mechanical properties of metals. The course covers topics such as alloy design, heat treatment, and metal processing techniques. Emphasis will be placed on the practical application of metallurgical principles in engineering design, materials selection, and manufacturing processes. Through laboratory experiments and case studies, students will gain hands-on experience in analyzing and optimizing the performance of metallic materials. By the end of the course, students will have the knowledge and skills to engineer and utilize metallurgical principles in mechanical engineering practice.			

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Code	Course/Module Title	ECTS	Semester
ME301	Engineering and numerical Analyses	8.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	77	123
Description			

This course on engineering and numerical analyses equips students with essential skills for solving complex engineering problems using numerical methods. Students will explore the principles and techniques of numerical analysis, including finite element analysis (FEA), computational fluid dynamics (CFD), and numerical optimization. The course covers topics such as numerical modeling, solution algorithms, and result interpretation. Emphasis will be placed on applying numerical methods to solve engineering challenges in areas like structural analysis, heat transfer, and fluid flow. Through hands-on projects and simulations, students will develop proficiency in utilizing engineering software and analyzing results to make informed design decisions. By the end of the course, students will be well-equipped to employ numerical analyses in various mechanical engineering applications.

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Code	Course/Module Title	ECTS	Semester
ME302	Conduction Heat Transfer	4.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
This course on conduction heat transfer focuses on understanding the principles and applications of heat conduction in mechanical engineering. Students will explore the fundamental concepts of conduction, including Fourier's law, thermal conductivity, and the heat diffusion equation. The course covers topics such as steady-state and transient conduction, one-dimensional and multi-dimensional heat transfer, and thermal resistance networks. Emphasis will be placed on solving conduction problems using analytical and numerical methods. Students will learn how to analyze heat conduction in various engineering systems, including heat exchangers, electronic devices, and insulation materials. By the end of the course, students will possess the knowledge and skills to analyze and design heat transfer systems involving conduction in mechanical engineering.			

Code	Course/Module Title	ECTS	Semester
ME303	Manufacturing Processes	6.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	71	79

Description

This course on manufacturing processes explores the fundamental techniques and technologies used in the production of mechanical components and products. Students will delve into various manufacturing methods, including casting, forming, machining, and joining processes. The course covers topics such as material selection, process planning, and quality control in manufacturing. Emphasis will be placed on understanding the principles behind each manufacturing process and their applications in different industries. Students will gain hands-on experience through laboratory exercises and industry visits, enhancing their knowledge of process optimization, automation, and sustainability in manufacturing. By the end of the course, students will possess a comprehensive understanding of manufacturing processes, enabling them to contribute effectively to the field of mechanical engineering.

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Code	Course/Module Title	ECTS	Semester
ME304	Fundamentals of Internal Combustion Engines	4.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	36
Description			
This course on the fundamentals of internal combustion engines provides a comprehensive understanding of the principles and operations of these crucial power sources. Students will explore the working principles of both spark ignition (SI) and compression ignition (CI) engines, including the thermodynamics of the air-fuel mixture, combustion processes, and power generation. The course covers topics such as engine cycles, fuel systems, ignition systems, and emissions control. Emphasis will be placed on understanding the performance parameters, efficiency optimization, and technological advancements in internal combustion engines. By the end of the course, students will have a solid foundation in internal combustion engines and be equipped with the knowledge to contribute to their design, analysis, and optimization in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME305	Gas dynamics	4.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
This course on gas dynamics explores the behavior and characteristics of compressible fluids, focusing on their applications in mechanical engineering. Students will delve into the fundamental principles of gas dynamics, including the equations of motion, conservation laws, and thermodynamic properties of compressible fluids. The course covers topics such as one-dimensional flow, shock waves, nozzle design, and supersonic and hypersonic flows. Emphasis will be placed on understanding the effects of compressibility on fluid flow and its implications for engineering systems. Through theoretical analysis and practical examples, students will gain a deeper understanding of gas dynamics and its significance in mechanical engineering applications.			

29

Code	Course/Module Title	ECTS	Semester
ME306	Theory of Machine	4.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
This course on the theory of machines provides a comprehensive understanding of the principles and analysis of mechanical systems. Students will explore the fundamentals of machine design, kinematics, and dynamics. The course covers topics such as mechanisms, linkages, cams, gears, and robotic systems. Emphasis will be placed on analyzing the motion, forces, and energy transfers in mechanical systems. Students will learn about mechanisms' synthesis, design considerations, and optimization techniques. Through practical examples and hands-on projects, students will gain proficiency in analyzing and designing machines that meet desired performance requirements. By the end of the course, students will possess the knowledge and skills to tackle complex engineering challenges related to the theory of machines in mechanical engineering.			

30

Code	Course/Module Title	ECTS	Semester
ME307	Convection Heat Transfer	5.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			

This course on convection heat transfer focuses on understanding the principles and applications of heat transfer through fluid flow in mechanical engineering. Students will explore the fundamentals of convection, including boundary layers, forced convection, and natural convection. The course covers topics such as heat transfer coefficients, correlations, and heat exchangers. Emphasis will be placed on analyzing convective heat transfer in various engineering systems, such as cooling of electronic devices, heat exchangers, and HVAC systems. Students will learn how to apply empirical and analytical methods to solve convection heat transfer problems. By the end of the course, students will possess the knowledge and skills to analyze and design heat transfer systems involving convection in mechanical engineering applications.

Code	Course/Module Title	ECTS	Semester
ME308	Electrical Machinery	5.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on electrical machinery explores the principles, design, and applications of electrical machines in mechanical engineering. Students will delve into the fundamentals of electrical machines, including generators, motors, and transformers. The course covers topics such as electromagnetism, machine construction, operating principles, and performance characteristics. Emphasis will be placed on understanding the interaction between electrical and mechanical systems, energy conversion, and control of electrical machines. Students will gain hands-on experience through laboratory experiments and projects, enhancing their knowledge of machine operation, efficiency optimization, and troubleshooting. By the end of the course, students will possess the knowledge and skills to analyze, design, and apply electrical machinery in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME309	Computer Aided Design (CAD/CAM)	6.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	56	94
Description			
This course on computer-aided design (CAD) and computer-aided manufacturing (CAM) focuses on utilizing advanced software tools for efficient product design and manufacturing in mechanical engineering. Students will explore the principles and techniques of CAD/CAM, including 3D modeling, assembly design, virtual prototyping, and simulation. The course covers topics such as geometric modeling, parametric design, finite element analysis (FEA), and computer numerical control (CNC) machining. Emphasis will be placed on hands-on experience using industry-standard CAD/CAM software to develop design solutions, optimize manufacturing processes, and integrate engineering analysis. By the end of the course, students will possess the skills to apply CAD/CAM technologies effectively in mechanical engineering practice, enhancing productivity and innovation.			

Code	Course/Module Title	ECTS	Semester
ME312	Design of Internal Combustion Engines	6.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	56	94
Description			
This course on the design of internal combustion engines provides a comprehensive understanding of the principles and methodologies involved in developing efficient and high-performance engines. Students will explore the key aspects of engine design, including combustion processes, intake and exhaust systems, fuel injection, and engine dynamics. The course covers topics such as cylinder design, piston and crankshaft analysis, valve mechanisms, and emissions control. Emphasis will be placed on integrating theory, analysis, and practical considerations to optimize engine performance, efficiency, and reliability. Through design projects and case studies, students will gain hands-on experience in designing and evaluating internal combustion engines. By the end of the course, students will possess the knowledge and skills to contribute to the design and development of internal combustion engines in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME310	Turbo machinery	6.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79
Description			
This course on turbomachinery focuses on understanding the principles and applications of various turbomachines in mechanical engineering. Students will explore the fundamentals of turbomachinery, including turbines, compressors, and pumps. The course covers topics such as fluid mechanics, thermodynamics, and performance characteristics of turbomachines. Emphasis will be placed on analyzing the flow behavior, energy conversion, and efficiency optimization in turbomachinery. Students will gain hands-on experience through laboratory experiments and simulations, enhancing their knowledge of machine operation, performance assessment, and troubleshooting. By the end of the course, students will possess the knowledge and skills to analyze, design, and apply turbomachinery in mechanical engineering applications, such as power generation, propulsion systems, and fluid transport.			

Code	Course/Module Title	ECTS	Semester
UR 301	English language skills	2.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33
Description			
This course on English language skills is designed to enhance communication abilities specifically for mechanical engineering professionals. Students will develop proficiency in technical writing, reading comprehension, oral presentations, and professional correspondence. The course covers topics such as technical vocabulary, grammar and syntax, effective communication strategies, and cross-cultural communication. Emphasis will be placed on acquiring the language skills necessary for writing reports, research papers, and project documentation. Students will also practice delivering technical presentations and participating in discussions related to mechanical engineering. By the end of the course, students will have the linguistic competence required to effectively communicate ideas, collaborate with colleagues, and succeed in their careers in the field of mechanical engineering.			

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Code	Course/Module Title	ECTS	Semester
ME311	Summer training		
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
Description			
This summer training course in mechanical engineering offers students the opportunity to gain practical industry experience and apply their theoretical knowledge in real-world scenarios. Participants will engage in hands-on training and work on projects related to various mechanical engineering disciplines. The training covers topics such as manufacturing processes, CAD/CAM, automation, and maintenance. Emphasis will be placed on developing technical skills, problem-solving abilities, and teamwork. Students will have the chance to work closely with professionals in the field, learn about industry standards and practices, and enhance their professional networks. By the end of the training, students will have valuable experience and be better equipped for their future careers in mechanical engineering.			

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Code	Course/Module Title	ECTS	Semester
ME401	Mechanical Vibrations	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	0	62	63
Description			

This course on mechanical vibrations provides a comprehensive understanding of the principles and analysis of vibrations in mechanical systems. Students will explore the fundamentals of vibrations, including single-degree-of-freedom and multi-degree-of-freedom systems. The course covers topics such as free and forced vibrations, damping, resonance, and vibration isolation. Emphasis will be placed on analyzing and predicting the behavior of mechanical systems under different vibration conditions. Students will learn techniques for vibration measurement, analysis, and control. Through theoretical concepts and practical examples, students will gain a deeper understanding of mechanical vibrations and their implications in engineering design and performance evaluation. By the end of the course, students will possess the knowledge and skills to analyze and mitigate vibrations in mechanical engineering applications.

Code	Course/Module Title	ECTS	Semester
ME402	Air Conditioning	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on air conditioning focuses on the principles, design, and applications of heating, ventilation, and air conditioning (HVAC) systems in mechanical engineering. Students will explore the fundamentals of psychrometrics, heat transfer, and fluid flow in HVAC systems. The course covers topics such as cooling load estimation, air distribution, refrigeration cycles, and energy efficiency. Emphasis will be placed on understanding the design considerations, equipment selection, and control strategies for effective air conditioning. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of HVAC system design, operation, and maintenance. By the end of the course, students will possess the knowledge and skills to design and analyze air conditioning systems for various mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME403	Engineering Materials	4.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0	52	48

Description

This course on engineering materials provides a comprehensive understanding of the properties, selection, and applications of materials in mechanical engineering. Students will explore the fundamentals of material science, including the structure-property relationships, mechanical behavior, and manufacturing processes of engineering materials. The course covers topics such as metals, polymers, ceramics, and composites. Emphasis will be placed on material selection based on mechanical, thermal, and chemical requirements. Students will gain hands-on experience through laboratory experiments and case studies, enhancing their knowledge of material characterization and failure analysis. By the end of the course, students will possess the knowledge and skills to make informed decisions regarding material selection and utilization in mechanical engineering applications.

40

Code	Course/Module Title	ECTS	Semester
ME404	Machine Design	6.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	1	72	78
Description			
This course on machine design focuses on the principles, methodologies, and techniques involved in the design of mechanical systems and components. Students will explore the fundamentals of machine design, including load analysis, stress and deflection calculations, and material selection. The course covers topics such as design for static and dynamic loading, power transmission, and mechanism synthesis. Emphasis will be placed on applying engineering principles to develop robust and reliable machine designs. Students will gain hands-on experience through design projects and simulations, enhancing their knowledge of design optimization, safety considerations, and manufacturing constraints. By the end of the course, students will possess the knowledge and skills to design innovative and functional machines in mechanical engineering applications.			

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Code	Course/Module Title	ECTS	Semester
ME405	Industrial Engineering and quality control	4.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0	52	48
Description			
This course on industrial engineering and quality control explores the principles and techniques for optimizing industrial processes and ensuring high-quality products in mechanical engineering. Students will delve into the fundamentals of industrial engineering, including work analysis, production planning, and facility layout. The course covers topics such as statistical quality control, process optimization, and lean manufacturing principles. Emphasis will be placed on understanding the concepts of total quality management, Six Sigma, and continuous improvement in industrial settings. Students will gain hands-on experience through case studies and industry projects, enhancing their knowledge of process optimization, defect prevention, and quality assurance. By the end of the course, students will possess the knowledge and skills to optimize industrial processes and implement effective quality control measures in mechanical engineering applications.			

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Code	Course/Module Title	ECTS	Semester
ME406	Engineering project	6.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	102	48
Description			
This course on engineering project provides students with practical experience in executing real-world projects within the field of mechanical engineering. Students will apply their knowledge and skills to undertake engineering projects from conception to completion. The course covers topics such as project management, feasibility analysis, design, prototyping, testing, and documentation. Emphasis will be placed on teamwork, problem-solving, and effective communication throughout the project lifecycle. Students will gain hands-on experience in project planning, resource allocation, risk management, and project evaluation. By the end of the course, students will have developed the abilities to successfully manage and execute engineering projects, preparing them for their future careers in mechanical engineering.			

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Code	Course/Module Title	ECTS	Semester
ME407	Engineering project	6.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	102	48
Description			

This course on engineering project provides students with practical experience in executing real-world projects within the field of mechanical engineering. Students will apply their knowledge and skills to undertake engineering projects from conception to completion. The course covers topics such as project management, feasibility analysis, design, prototyping, testing, and documentation. Emphasis will be placed on teamwork, problem-solving, and effective communication throughout the project lifecycle. Students will gain hands-on experience in project planning, resource allocation, risk management, and project evaluation. By the end of the course, students will have developed the abilities to successfully manage and execute engineering projects, preparing them for their future careers in mechanical engineering.

Code	Course/Module Title	ECTS	Semester
ME408	Refrigeration	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64

Description

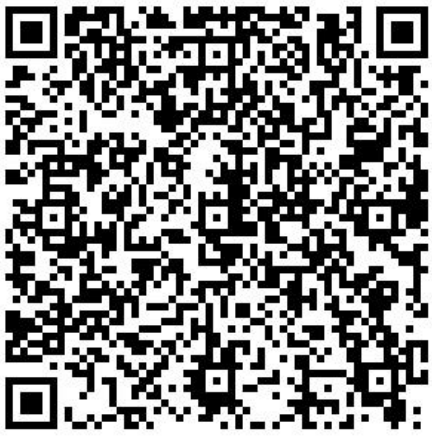
This course on refrigeration focuses on the principles, design, and applications of refrigeration systems in mechanical engineering. Students will explore the fundamentals of thermodynamics, heat transfer, and fluid mechanics as they relate to refrigeration. The course covers topics such as refrigeration cycles, refrigerants, compressors, heat exchangers, and system components. Emphasis will be placed on understanding the design considerations, energy efficiency, and environmental impact of refrigeration systems. Students will gain hands-on experience through practical projects and laboratory experiments, enhancing their knowledge of refrigeration system operation, troubleshooting, and maintenance. By the end of the course, students will possess the knowledge and skills to design, analyze, and optimize refrigeration systems for various mechanical engineering applications.

Code	Course/Module Title	ECTS	Semester
ME409	Design of Machine Systems	6.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	1	72	78
Description			
This course on the design of machine systems provides a comprehensive understanding of the principles and methodologies involved in developing efficient and functional machine systems. Students will explore the fundamentals of system design, including system integration, kinematics, dynamics, and control. The course covers topics such as mechanical power transmission, motion control, and system optimization. Emphasis will be placed on applying engineering principles to design machine systems that meet specific performance requirements. Students will gain hands-on experience through design projects and simulations, enhancing their knowledge of system modeling, analysis, and validation. By the end of the course, students will possess the knowledge and skills to design innovative and reliable machine systems in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME410	Power plants	7.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	82	93
Description			
This course on power plants focuses on the principles, design, and operation of power generation systems in mechanical engineering. Students will explore various types of power plants, including thermal, hydroelectric, nuclear, and renewable energy systems. The course covers topics such as energy conversion, thermodynamics, power generation technologies, and environmental considerations. Emphasis will be placed on understanding the design and performance optimization of power plants for efficient and sustainable electricity generation. Students will gain hands-on experience through case studies and analysis of power plant components and systems. By the end of the course, students will possess the knowledge and skills to analyze, design, and operate power plants in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME411	Control and measurements	4.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
This course on control and measurements focuses on the principles and techniques for controlling and measuring mechanical systems in engineering applications. Students will explore the fundamentals of control theory, including feedback control, system dynamics, and stability analysis. The course covers topics such as sensors and transducers, data acquisition, signal conditioning, and instrumentation. Emphasis will be placed on understanding the design and implementation of control systems and measurement techniques for accurate system monitoring and regulation. Students will gain hands-on experience through laboratory experiments and practical projects, enhancing their knowledge of system behavior, control algorithms, and measurement accuracy. By the end of the course, students will possess the knowledge and skills to design and optimize control and measurement systems in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ER 401	Ethics	2.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33
Description			
This course on ethics explores the ethical considerations and responsibilities in the field of mechanical engineering. Students will examine the ethical principles and values that guide professional conduct and decision-making. The course covers topics such as integrity, accountability, sustainability, and social impact of engineering projects. Emphasis will be placed on understanding the ethical dilemmas and challenges faced by mechanical engineers in their professional practice. Students will engage in case studies and discussions to develop critical thinking and ethical reasoning skills. By the end of the course, students will possess the knowledge and skills to make ethically informed decisions and contribute responsibly to society as mechanical engineering professionals.			



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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	METALLURGY			**Module Delivery**	
Module Type	BASIC			**Theory** **Lecture** **Lab/ Practical** **Tutorial** **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	ME		**College**	ER	
Module Leader	Dr. Kamal S. Mekki		**e-mail**	salah.ismaeel@uobaghdad.edu.iq	
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D	
Module Tutor	Dr. Kamal S. Mekki		**e-mail**	Kamal-s@utq.edu.iq	
Peer Reviewer Name	Prof. Dr. Adnan A. Ugla		**e-mail**	Adnan-alomary@utq.edu.iq	
Review Committee Approval	20 /06/2023		**Version Number**		

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	s	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	This module aims to: 1. develop an understanding of the applied metallurgy of principal engineering alloys, to include structure & properties of metals and alloys, Phase diagrams, metal extraction, ferrous materials, heat treatments, 2. provide the background necessary to make informed decisions and recommendations concerning the suitability of metals and alloys for engineering applications. It explores the way in which alloys are used and the way in which production and fabrication routes influence their fitness for purpose. 3. help in understanding the chemical make-up and different macroscopic and microscopic structure. 4. The microstructure of a metal, the structural features that are control to observation under a microscope. 5. Chemical composition is the relative content of a particular element within an alloy, usually expressed as a percent weight. Metals and their alloys are widely used in our daily live		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On completion of the module, the student is expected to:** 1. Gain knowledge and understanding of applied metallurgy (structure, properties, application, etc.). 2. Develop skills in material selection and processes used for physical property manipulation 3. Be able to apply the knowledge gained across a range of industrial sectors. 4. Understand the structures, properties and applications of metals. 5. Apply the acquired knowledge to make appropriate materials selection for engineering applications.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.		

	• Introduction to the structure of metals, reviewing aspects such as crystal structure, mechanical properties, crystal defects and their effects on alloy properties • Application of metallurgical principles in the extraction and processing of iron and aluminium • Theory of diffusion and the phenomenon of mass transport for heat treatments • Phase diagrams (equilibrium and non-equilibrium conditions), focusing on steel phase transformations • Heat treatments, primarily for steel alloys; hardening, softening and conditioning
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning: Gain knowledge and understanding of applied metallurgy Exhibit knowledge of fundamental materials science over a range of common engineering alloys Demonstrate understanding of heat treatments, corrosion science and welding engineering Develop skills in material selection and processes used for physical property manipulation Demonstrate understanding and application of material selection principles Evidence competence in applying advanced strategies for material and process selection Be able to apply knowledge across several industrial sectors Present understanding of diverse heat treatment processes within an industrial context Exhibit knowledge of the degradation phenomena influencing a variety of engineering materials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	5, 10, 15	
	Assignments	2	5% (5)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction
Week 2	Classification of engineering materials
Week 3	Crystal structure
Week 4	Imperfections in crystals
Week 5	Solidification, Cooling Curves, Nucleation, Equilibrium Diagrams
Week 6	Thermal Equilibrium diagrams, Substitution solid solution, Interstitial solid solution, BINARY ISOMORPHOUS SYSTEMS
Week 7	Lever rule
Week 8	Applications on binary phase diagrams
Week 9	Miller indices
Week 10	XRD and Bragg's law
Week 11	Heat Treatment of Steel, Types of Heat Treatment Processes, Annealing
Week 12	Normalizing, Hardening, Tempering, Nitriding, Carburising, Case hardening or surface hardening
Week 13	Alloy Steel, Manganese Steel, stainless steel
Week 14	Austenitic steels, ferritic steels, Martensitic steels, Duplex stainless steels, Precipitation-hardening stainless steel, Tool steel
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Introduction to materials properties
Week 2	Lab 2: Sample preparation

Week 3	Lab 3: Microstructure inspection by optical microscopy
Week 4	Lab 4: Heat treatments
Week 5	Lab 5: Heat treatments
Week 6	Lab.6 Microhardness test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering, An Introduction (William D. Callister, Jr.) Engineering Metallurgy by E. C. Rollason, (ELBS)	Yes
Recommended Texts	Introduction to MATERIALS SCIENCE FOR ENGINEERS (James F.Shackelford)	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/Metallurgy-engineering	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

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

Ministry of Higher Education and

Scientific Research - Iraq

University of Thi-Qar

College of Engineering

Department of Mechanical Engineering

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	PRPERTIES OF MATERIALS	**Module Delivery**

Module Type	CORE	**Theory** **Lecture** **Lab** **Practical** **Seminar**	
Module Code	ME105		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGx11 1	**Semester of Delivery**	two
Administering Department	ME	**College**	ER
Module Leader	Dr. Adnan A. Ugla	**e-mail**	Adnan-alomary@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	L. Dr. Kamal Sahib M.	**e-mail**	
Review Committee Approval	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 provide an understanding of the classification, properties, and testing methods of engineering materials. 2. To explore the properties of ferrous and non-ferrous metals. 3. To familiarize students with various mechanical tests and the principles of the material properties through application of different loads. 4. To introduce the principles and analysis of tensile test, hardness test, fatigue test, impact test, and creep test.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Classify engineering materials and describe their mechanical properties. 2. Conduct destructive and non-destructive tests on engineering materials. 3. Explain the principle of all mechanical loads and their effects on the mechanical tests. 4. Understand the principles and analysis of tension test results. 5. Understand the principles and analysis of impact test results 6. Understand the principles and analysis of fatigue test results. 7. Understand the principles and analysis of creep test results
Indicative Contents المحتويات الإرشادية	Introduction/ physical properties, chemical properties, mechanical properties, Definitions of mechanical properties, mechanical load types, tension test results, impact test results, hardness test results, fatigue test results, creep test results

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Engineering Materials: Classification of engineering materials
Week 2	Ferrous Metals
Week 3	Non-Ferrous Metals
Week 4	Engineering Materials: Destructive and non-destructive tests
Week 5	Physical properties of materials
Week 6	chemical properties of materials
Week 7	Mechanical load classification and definition
Week 8	Mechanical properties definition
Week 9	Tension test

Week 10	Hardness test
Week 11	Fatigue test
Week 12	Impact test
Week 13	Creep test
Week 14	Plastic Industry: Properties and classification of plastics
Week 15	Plastic Industry: thermal and mechanical Properties
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Hardness (Rockwell and Brinell) tests
Week 2	Lab 2: Hardness (Vickers macro and micro hardness) tests
Week 3	Lab 3: tension test
Week 4	Lab 4: tension test
Week 5	Lab 5: impact test
Week 6	Lab 6: fatigue test
Week 7	Lab 6: fatigue test

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

Required Texts	Introduction to Basic Manufacturing Processes and Workshop Technology Book by Rajender Singh https://blogpuneet.files.wordpress.com/2013/07/introduction-to-basic-manufacturing-processes-and-workshop technology.pdf	No
Recommended Texts		
Websites	https://www.aboutmech.com/ https://faculty.uobasrah.edu.iq/faculty/en/1660/teaching	

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	PRINCIPLES OF PRODUCTION PROCESSES	**Module Delivery**

Module Type	CORE		**Theory** **Lecture** **Lab** **Practical** **Seminar**	
Module Code	ME303			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGx11 1	**Semester of Delivery**	ONE	
Administering Department	ME	**College**	ER	
Module Leader	Dr. Adnan A. Ugla	**e-mail**	Adnan-alomary@utq.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	L. Dr. Hamal Sahib M.	**e-mail**		
Review Committee Approval	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	5. To provide an understanding of the classification, properties, and testing methods of engineering materials. 6. To explore the production processes of ferrous and non-ferrous metals, plastics, ceramics, and powder metallurgy. 7. To familiarize students with various casting techniques and the principles of the solidification process. 8. To introduce the principles and analysis of cold and hot working processes, including rolling, extrusion, drawing, and welding technologies.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	8. Classify engineering materials and describe their mechanical properties. 9. Conduct destructive and non-destructive tests on engineering materials. 10. Explain the production processes of cast iron, steel, copper, aluminum, zinc, lead, tin, plastics, ceramics, and powder metallurgy. 11. Understand the principles and analyze force requirements in hot rolling, hot extrusion, and hot drawing processes. 12. Identify different welding processes and their applications. 13. Describe the types and analyze the force requirements in various hot and cold working processes. 14. Explain the principles and processes involved in various casting techniques
Indicative Contents المحتويات الإرشادية	Introduction, Definition / manufacturing systems, manufacturing processes, material selection, metal foundry, casting processes, metal removal processes, machining processes, sheet metal forming, metal deformation, joining processes, welding processes, and powder metallurgy

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)			

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Engineering Materials: Classification of engineering materials, Mechanical properties of material
Week 2	Engineering Materials: Destructive and non-destructive tests
Week 3	Ferrous Metal Production: Production of cast iron
Week 4	Ferrous Metal Production: Steel production
Week 5	Non-Ferrous Metal Production: Copper metal production
Week 6	Non-Ferrous Metal Production: Aluminum metal production
Week 7	Non-Ferrous Metal Production: Zinc, lead, and tin production

Week 8	Plastic Industry: Properties and classification of plastics
Week 9	Plastic Industry: Plastics production
Week 10	Ceramic Industry: Classification of ceramics, Ceramics production
Week 11	Cold and Hot Working: Principles of cold and hot working processes
Week 12	Hot Rolling: Principles of rolling processes, Rolling types, Force analysis in rolling
Week 13	Drawing Process: Types of hot drawing, Drawing analysis
Week 14	Hot Extrusion: Types of hot extrusion, Force analysis in extrusion
Week 15	Powder Metallurgy: Principles of powder metallurgy, Powder metallurgy production Casting: Casting types, Casting sandy process
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: workshop of sharper machine
Week 2	Lab 2: workshop of drilling machine
Week 3	Lab 3: workshop of lathe machine
Week 4	Lab 4: workshop types of Files Tools
Week 5	Lab 5: workshop of grinding machine
Week 6	Lab 6: workshop of Milling
Week 7	Lab 7: workshop of Carpentry
Week 8	Lab 9: workshop of welding

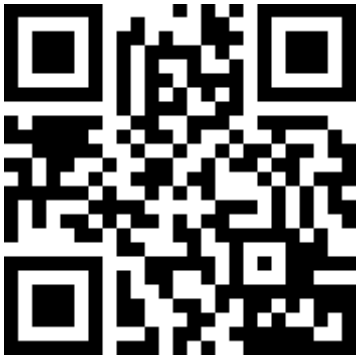
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to materials science Jea P Mercier, Gerald Zambelli, Wilfried Kurz 2002 Edition	No
Recommended Texts	Materials science and engineering: an introduction William D.Callister Wiley 2018	
Websites	https://www.aboutmech.com/ https://faculty.uobasrah.edu.iq/faculty/en/1660/teaching	

APPENDIX:

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

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

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



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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	METALLURGY	**Module Delivery**	
Module Type	BASIC	**Theory** **Lecture** **Lab/ Practical** **Tutorial** **Seminar**	
Module Code			
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Kamal S. Mekki	**e-mail**	salah.ismaeel@uobaghdad.edu.iq
Module Leader's Acad. Title	Asst. Professor	**Module Leader's Qualification**	Ph.D
Module Tutor	Dr. Kamal S. Mekki	**e-mail**	Kamal-s@utq.edu.iq
Peer Reviewer Name		**e-mail**	zaid.ahmad@uobaghdad.edu.iq
Review Committee Approval	/06/2023	**Version Number**	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	Properties of Materials	**Semester**	2

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

Module Aims أهداف المادة الدراسية	This module aims to develop an understanding of the applied metallurgy of principal engineering alloys, to include structure & properties of metals and alloys, Phase diagrams, metal extraction, ferrous materials, heat treatments,
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On completion of the module, the student is expected to:** Gain knowledge and understanding of applied metallurgy (structure, properties, application, etc.).

	Develop skills in material selection and processes used for physical property manipulation Be able to apply the knowledge gained across a range of industrial sectors
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to the structure of metals, reviewing aspects such as crystal structure, mechanical properties, crystal defects and their effects on alloy properties • Application of metallurgical principles in the extraction and processing of iron and aluminium • Theory of diffusion and the phenomenon of mass transport for heat treatments • Phase diagrams (equilibrium and non-equilibrium conditions), focusing on steel phase transformations • Heat treatments, primarily for steel alloys; hardening, softening and conditioning
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning: Gain knowledge and understanding of applied metallurgy Exhibit knowledge of fundamental materials science over a range of common engineering alloys Demonstrate understanding of heat treatments, corrosion science and welding engineering Develop skills in material selection and processes used for physical property manipulation Demonstrate understanding and application of material selection principles Evidence competence in applying advanced strategies for material and process selection

	Be able to apply knowledge across several industrial sectors Present understanding of diverse heat treatment processes within an industrial context Exhibit knowledge of the degradation phenomena influencing a variety of engineering materials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	5, 10, 15	
	Assignments	2	5% (5)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction
Week 2	Classification of engineering materials
Week 3	Crystal structure
Week 4	Imperfections in crystals
Week 5	Thermal equilibrium diagrams
Week 6	Lever rule
Week 7	Applications on binary phase diagrams
Week 8	Miller indices
Week 9	XRD and Bragg's law
Week 10	Mechanical properties of metals
Week 11	Carbon steel
Week 12	Alloy steel
Week 13	Cast Iron
Week 14	Heat treatment of steel
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Introduction to materials properties
Week 2	Lab 2: Sample preparation
Week 3	Lab 3: Microstructure inspection by optical microscopy
Week 4	Lab 4: Mechanical tests / Tensile
Week 5	Lab 5: Mechanical tests / Hardness / Charpy
Week 6	Lab 6: Heat treatments
Week 7	Lab 7: Heat treatments

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering, An Introduction (William D. Callister, Jr.) Engineering Metallurgy by E. C. Rollason, (ELBS)	Yes
Recommended Texts	Introduction to MATERIALS SCIENCE FOR ENGINEERS (James F.Shackelford)	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/Metallurgy-engineering	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

Ministry of Higher Education and Scientific Research - Iraq

University of Thi-Qar

College of Engineering

Department of Mechanical Engineering

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	ENGINEERING DRAWING +DESCRIPTIVE ENGINEERING	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 104		
ECTS Credits	7		
SWL (hr/sem)	175		

Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Mustafa M. Mansor	**e-mail**	Mustafa.muhammedali @utq.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

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	Provide students with: An understanding of the definition, necessary backgournd and importance of the subject of Mechanical Eng. Drawing, apply the basic terminology, concepts, principles and theories of it in order to: • Be able to draw mechanical elements, • Be able to apply geometrical and dimensional tolerances, • Practice assembly drawings,

	• Be able to use drawing software packages for drawing both mechanical elements and assembly drawings. Skills of hand drawing of sketches.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply knowledge of mathematics, science, and engineering 2. Design a system, component, or process to meet desired needs 3. Use the techniques, skills, and modern engineering tools necessary for engineering practice
Indicative Contents المحتويات الإرشادية	• Introduction to drawing, • engineering drawing / line tools and types of lines, • engineering operations, projections, 1-Semi-straight line 2- Divide the line into a number of equal parts 3- Draw a straight line parallel to another line 4- Draw a straight line parallel to another straight line using the triangle and the letter T ruler 5- Divide the angle 6- Divide an angle into a number of equal parts 7- Draw a regular triangle given the sides 8- Draw an arc touching two straight lines 9- Draw an arc touching another arc and a straight line 10- Draw an arc that touches two other arcs 11 - Draw a regular pentagon 12 - Draw a regular hexagon 13- Divide the circle into seven equal parts 14- Divide the circle into eight equal parts 15- Draw an ellipse using the four-center method • Truncated projections, reproduction of an unknown projection of a known projection (the third projection), • dimensioning on the projections, • Free drawing, stereoscopic drawing, reproduction of figures from projections, cutting in figures, dimensions in figures
Learning and Teaching Strategies	

استراتيجيات التعلم والتعليم	
Strategies	Skills of using a drafting package. Geometrical and dimensional tolerances. Applications on mechanical elements (bolted, welded and riveted joints, shafts and keys, springs, gears). Applications on assembly and working drawings (valves, presses etc.) Descriptive geometry and methods of projection, Projection of point, Projection of straight line, Projection plane surface, Auxiliary planes, Development, Application.

Student Workload (SWL)

الحمل الدراسي للطالب

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	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

As		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	20% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	40% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to drawing,
Week 2	engineering drawing / line tools and types of lines,
Week 3	line tools and types of lines +Descriptive geometry
Week 4	engineering operations
Week 5	engineering operations + methods of projection,
Week 6	engineering operations +Projection of point .
Week 7	Mid-term Exam+, Projection of straight line,
Week 8	projections
Week 9	projections + Projection plane surface
Week 10	Truncated projections
Week 11	reproduction of an unknown projection of a known projection (the third projection)
Week 12	dimensioning on the projections
Week 13	Free drawing, stereoscopic drawing+ Auxiliary planes, Development, Application

Week 14	reproduction of figures from projections, cutting in figures, dimensions in figures
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Textbooks and References • "Engineering Design Graphics", James H. Earle, AutoCAD 2004, Pearson Education Inc.	Yes
Recommended Texts	• "Engineering Drawing" with a primer on AutoCAD, Archad Noor etc. Prentice-Hall 200	No
Websites		

APPENDIX:

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

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

Note:

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	MATHEMATICS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	ER101				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGx11 1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Hayder Abdulhasan Lafta		**e-mail**	hayderlafta@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr. Ahmed Shkara		**e-mail**	Ahmedshkara@utq.edu.iq	
Review Committee Approval	12/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims			

أهداف المادة الدراسية	1. To develop problem solving skills and understanding of mathematics theory through the application of techniques. 2. To understand how function and its draw. 3. This course deals with the basic concept of functions and its behavior. 4. This is the basic subject for all mathematics and calculus subject. 5. To understand the derivative and integral problems. 6. To perform methods of integration analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	2. Recognize how function works and its slope. 3. Discuss the various problems about the real numbers and equations of lines and inequalities. 4. Summarize what is meant by a basic Algebra. 5. Discuss the analysis of graphs of functions. 6. Describe the inverse, exponential and logarithmic functions. 7. Define the systems of matrices. 8. Identify the basic derivatives and their applications. 9. Discuss the operations of integral and numeric integral. 10. Discuss the various problems of integral and its application. 11. Explain the methods of integration.
Indicative Contents المحتويات الإرشادية	None
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction – algebraic functions and its inverse.
Week 2	Linear functions, Equations and inequalities
Week 3	Limits and continuity
Week 4	Derivative and it's applications
Week 5	Hyperbolic functions
Week 6	Introduction to Integral
Week 7	Applications of integration.
Week 8	Introduction to methods of integration
Week 9	Methods of integration
Week 10	Methods of integration
Week 11	Methods of integration
Week 12	Matrices and determinants
Week 13	Numerical method to solve non-linear algebraic equations
Week 14	Trapezoidal and Simpsons rule
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Thomas, G.B., Finney, R.L., Weir, M.D. and Giordano, F.R., 2003. *Thomas' calculus*. Reading: Addison-Wesley.	Yes
Recommended Texts	Hornsby, J., Lial, M.L. and Rockswold, G.K., 2011. *A Graphical Approach to Algebra and Trigonometry*. Addison Wesley.	No
Websites		

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ENGINEERING MECHANICS (DYNAMICS)			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME103				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGx11 2		**Semester of Delivery**	4	
Administering Department			**College**		
Module Leader	Dr. Ahmed A. Ouda		**e-mail**	Ouda1978@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Assist Prof. Dr. Ahmad J. Sh.		**e-mail**	shakarah@utq.edu.iq	
Review Committee Approval	11/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ER101 ER103 ME103	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	The main objectives of the course are to: 7. The application of analytical techniques to the solution of important engineering dynamics problems. It aims to develop the student understanding and their ability to solve advanced dynamics problems related to machine dynamics and vibration.		

	8. The deformation and failure of statically loaded engineering materials and structures and the analytical procedures that can be utilised to preclude such failures. This part aims to enhance the student understanding of the deformation and failure of statically loaded engineering materials and structures and the analytical procedures that can be utilised to preclude such failures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successfully completing the module students will have knowledge and understanding of: 1. kinematics and kinetics of rigid bodies 2. dynamic equations of motion for rigid bodies in 2D and 3D 3. analysis of dynamic forces of mechanisms 4. work and energy 5. vibration theory with its applications to engineering problems
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - kinematics and kinetics of particles; - dynamic equations of motion for rigid bodies in two dimensions; - equations of motion for rigid bodies in three dimensions; - response of linear systems to general loading, damping, force transmission; - two degree of freedom systems: Gears (Spur, Helical, Bevel and Worm Gears); - Vibration of discrete and continuous systems, Vibration of continuous systems;
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, in-class examples and exercises Homework, exams, final exam.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (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

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)		
	Homeworks	5	10% (10)		
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2 hr	20% (10)		
	Final Exam	2hr	60% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction
Week 2	Dynamics of Particles
Week 3	Dynamics of Particles
Week 4	Work and energy of Particles
Week 5	Work and energy of Particles

Week 6	3D Dynamics of Particles
Week 7	3D Dynamics of Particles
Week 8	3D Work and energy of Particles
Week 9	3D Work and energy of Particles
Week 10	Dynamics of Rigid Bodies
Week 11	Dynamics of Rigid Bodies
Week 12	Work and energy of Rigid Bodies
Week 13	Work and energy of Rigid Bodies
Week 14	3D Dynamics of Rigid Bodies
Week 15	**Preparatory Week**
Week 16	**Final Exam**

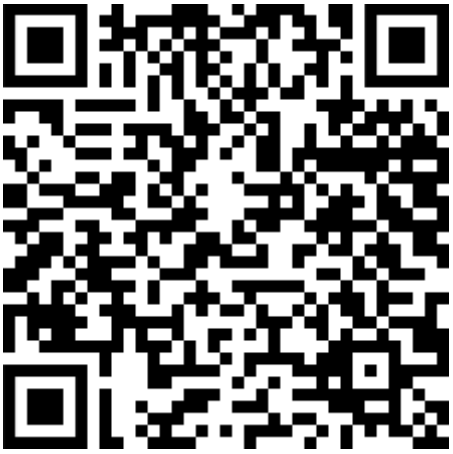
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Kinematics, Dynamics, and Design of Machinery; Kenneth J. Waldron, Gary L. Kinzel, Sunil K. Agrawal, Wiley, 2016 Kinematics and Dynamics of Machinery; Robert L. Norton, McGraw Hill, 2009	Yes
Recommended Texts		No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering	

APPENDIX:

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

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



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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	ENGINEERING MECHANICS I - STATIC I	**Module Delivery**

Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME103				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGx11 1	**Semester of Delivery**		2
Administering Department			**College**		
Module Leader	Dr. Ahmed A. Ouda		**e-mail**	Ouda1978@utq.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Assist Prof. Dr. Ahmad J. Sh.	**e-mail**	shakarah@utq.edu.iq	
Review Committee Approval		11/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main objectives of the course are to: 9. Provide a thorough understanding of the principles governing the forces applied on objects in equilibrium. 10. Provide the necessary tools and mathematical background for the analysis of objects in equilibrium. 11. Develop problem-solving skills for a wide variety of practical engineering problems that involve objects at rest. 12. Introduce techniques and methodologies for the effective analysis of objects and structures at rest. 13. Introduce the concepts of supports and loads that are acting on a structural system under equilibrium conditions.

	14. Develop the ability to determine internal and external forces and bending moments of structures and machines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completion of the course students are expected to: 12. Use free-body diagrams and apply vector analysis to solve equilibrium problems for particles or rigid bodies in two- and three-dimensional space. 13. Use techniques to determine the forces acted on members of trusses and machines in equilibrium. 14. Determine whether an object is statically indeterminate. 15. Use integration and geometrical computations to calculate centroids of lines, areas, and volumes. 16. Calculate internal forces and bending moment of members in equilibrium. 17. Determine the moment of inertial of areas by integration and parallel-axis theorem. 18. Solve problems involving non-uniform loads and friction.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Overview of vectors Free-body diagrams System of forces and moments Objects in equilibrium (2-D and 3-D problems) Structures in equilibrium including trusses, frames and machines Centroids and centers of mass Moments of inertial including parallel-axis theorem Distributed forces and loads including internal forces (shear force, axial force, and bending moment) Friction Virtual work and potential energy
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, in-class examples and exercises Homework, exams, final exam.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
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

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)		
	Homeworks	5	10% (10)		
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	20% (10)		
	Final Exam	2hr	60% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction (Chapter 1 in Textbook)
Week 2	Statics of Particles (Chapter 2)
Week 3	Statics of Particles (Chapter 2)
Week 4	Rigid Bodies: Equivalent System of Forces (Chapter 3)
Week 5	Rigid Bodies: Equivalent System of Forces (Chapter 3)
Week 6	Equilibrium of Rigid Bodies (Chapter 4)
Week 7	Equilibrium of Rigid Bodies (Chapter 4)
Week 8	Analysis of Trusses (Chapter 6)
Week 9	Analysis of Trusses (Chapter 6)
Week 10	Analysis of Beams (Chapter 7)
Week 11	Analysis of Beams (Chapter 7)
Week 12	Friction (Chapter 8)
Week 13	Geometric Properties of Surfaces (Chapter 5 and Chapter 9)
Week 14	Geometric Properties of Surfaces (Chapter 5 and Chapter 9)
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

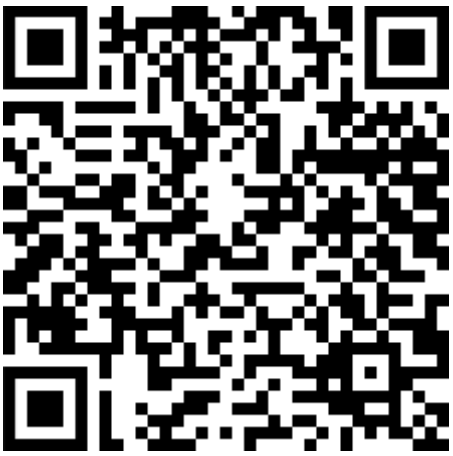
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Engineering Mechanics-Statics, 3rd SI Ed., Hibbeler, R. C., Prentice Hall, 2005. 2. Engineering Statics, 3rd SI Ed., Meriam J. L., Kraige L. G., John Wiley, 2003.	Yes
Recommended Texts	Vector Mechanics for Engineers–Statics, 7th SI Ed., Beer F. P., Johnston E. R. and Eisenberg E. R., McGraw-Hill, 2004.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering	

APPENDIX:

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

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

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



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	BASICS OF ENGLISH LANGUAGE		**Module Delivery**	
Module Type	SUPLEMENT		**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	UR 102			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	١UGx11		**Semester of Delivery**	2
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader	Sarah Rabeea Nashee		**e-mail**	
Module Leader's Acad. Title			**Module Leader's Qualification**	Ph.D.
Module Tutor	None		**e-mail**	Sara.rabee@utq.edu.iq
Peer Reviewer Name	Ahmed j. Shkara		**e-mail**	
Review Committee Approval	03/06/2023		**Version Number**	1.0

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

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

Module Aims أهداف المادة الدراسية	1. To develop students' English language skills 2. To strengthen speaking and listening in English 3. Facilitate the learning of engineering specialization by mastering the English language to accept many educational resources related to engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develops speaking and discussion skills in English 2. The ability to form complete sentences in different tenses and to suit the dialogue time 3. Writing formal and informal letters 4. Mastering English grammar with the correct spelling of words
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Parts of speech (nouns, pronouns, verbs, adverbs, prepositions, conjunctions, with learning the structure of the sentences, quiz 4 hour interjections); kinds of sentences (simple, compound, complex); subordinate clauses; 4 hour change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. 4 hour Modal verbs 2 hour prefixes and suffixes 2 hour Politely request 2 hour

	Conjuctions 2 hour

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome

Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	none			
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Parts of speech (nouns, pronouns, verbs, adverbs, prepositions L1
Week 2	Parts of speech (nouns, pronouns, verbs, adverbs, prepositions L2
Week 3	Interjections l1
Week 4	Interjections L2
Week 5	change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. L1
Week 6	change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. L2
Week 7	Verbs
Week 8	Mid-term Exam
Week 9	Writing the essay or article l1
Week 10	Writing the essay or article l1
Week 11	Modal verbs
Week 12	prefixes and suffixes

Week 13	Politely request
Week 14	Conjunctions
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	English Grammar, Raymond murfy, 1985	No
Recommended Texts	English structure , 2020	No
Websites	https://www.examveda.com/competitive-english/practice-mcq-question-on-grammar/	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	ELECTRICAL CIRCUITS	Module Delivery
Module Type	CORE	☒Theory ☒Lecture ☒Lab ☐Tutorial ☐Practical ☐Seminar
Module Code	UoB12345	
ECTS Credits	8	
SWL (hr/sem)	200	

Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Name	**e-mail**	E-mail
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

نرى ان اللغة العربية هي لغة بينية ومتداخلة وذات صلة بجميع العلوم الاخرى لا سيما وانها اكتسبت قداستها لارتباطها الوثيق بالقرآن الكريم، وقال ابن كثير معللاً اختيار العربية لغة للقرآن الكريم: «وذلك لأن لغة العرب أفصح اللغات وأبينها وأوسعها، وأكثرها تأدية للمعاني التي تقوم بالنفوس؛ فلهذا أنزل أشرف الكتب بأشرف اللغات»[٤]. كما أن «اختيار الله للعربية، أو اللسان العربي، ليكون أداة التوصيل، ووسيلة الإبانة، ووعاء التفكير لها.

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1.التعرّف على مواطن الجمال في اللّغة العربيّة وآدابها، وأن يكتسب الطالب القدرة على دراسة فروع اللّغة العربيّة. 2.تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام 3.تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير. 4.تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم 5.تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. 6.تعويد الطلاب على قواعد الحديث واحترام الرأي الآخر وكذلك التغلب على عامل الخجل.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.الاهداف المعرفية 2.تذكر المعلومات التي درسها واستدعاؤها عند الحاجة 3.فهم المعلومات والشروح التي تفسر بعض الظواهر اللغوية والأدبية 4.تطبيق جميع ما تعلمه ودرسه الطلبة في حياتهم العملية 5.تحليل المشكلة او الموضوع الذي يتالف من اجزاء مختلفة ودراستها 6.تركيب اجزاء الجملة لمعرفة معنى كل جزء على حدة مع الاطلاع على المفاهيم الأدبية والأغراض الشعرية
Indicative Contents المحتويات الإرشادية	اللغة العربيّة أو لغة الضاد هي واحدة من أكثر اللغات انتشاراً ضمن مجموعة اللغات الساميّة، في دول الوطن العربي إضافةً للعديد من المناطق الأخرى مثل تركيّا، والأحواز، ومالي وتشاد، والسنغال، وإثيوبيا، وأريتيريا، وإيران، وجنوبي السودان. اللغة العربيّة تعتبر لغةً مقدسة على اعتبار أنها لغة القرآن، حيث لا تتم الصلاة والعبادات الأخرى في الدين الإسلامي إلا بإتقان اللغة العربيّة، كما أنها لغة شعائريّة لدى عددٍ من الكنائس المسيحيّة على امتداد الوطن العربي، وقد تمّت كتابة العديد من الأعمال الفكريّة والدينيّة اليهوديّة بها وتحديداً في العصور الوسطى. كان لانتشار الدين الإسلامي تأثيراً مباشراً وغير مباشر في رفع شأن ومكانة اللغة العربيّة، حيث أصبحت لغة العلم والأدب والسياسة لأزمنةٍ طويلة في الديار التي حكمها المسلمون، بالإضافة لهذا فقد كان للغة العربيّة تأثيرٌ كبير على عددٍ من اللغات الأخرى على امتداد العالم الإسلامي.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	1.إثارة اسئلة متنوعة يمكن عبرها استدعاء المعلومات 2.شرح موضوع ما عبر مصادر متنوعة ومحاولة ربط المصادر بعضها ببعض 3.مشاهدة بعض البرامج والندوات العلمية والمؤتمرات العلمية والتربوية

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	**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	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

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

Learning and Teaching Resources

مصادر التعلم والتدريس

1.شرح ابن عقيل

2.معجم اللغة العربية

3.شذا العرف في فن الصرف

4.كتب الادب والشعر

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.

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	PRINCIPLES OF COMPUTER SCIENCE	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 102		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	ME	**College**	ER
Module Leader	Dr.Ahmed jassim shkaraj	**e-mail**	shkarah@utq.edu.iq
Module Leader's Acad. Title	Assist.Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Ahmed ouda	**e-mail**	ouda1978@gmail.com
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

Module Aims أهداف المادة الدراسية	The theoretical foundations of computer engineering have expanded substantially in recent years. The objective of this course is to introduce students to this fundamental area of computer science which enables students to focus on the study of programming languages. These languages allow the students to assess what could be achieved through computing when they are using it to solve problems in science and engineering. The course exposes students to the programming with C++, as well as to its usage for problem solving. The course introduces basic programming instructions

	and their properties, and the necessary mathematical libraries to develop different software applications. Upon completion of this course the students are expected to become proficient in key topics of C++ programming, and to have the opportunity to explore the current topics in this area.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of programming in C++ 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	1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, and plasma screens. 3. Self-learning through homework and mini-projects within the lectures.

	4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars held in the department.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2,
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8
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	Introduction to computer fundamentals
Week 2	Introduction-Algorithms-Example of Algorithms
Week 3	Flowcharts-Symbols and Idiomatic Forms in Flowcharts- Types of Flowcharts
Week 4	Completing the topic of Flowcharts type-Example of Flowcharts
Week 5	Basics of programming in C++ language program parts- language components (language codes, special words, variables)
Week 6	Office functions, types of variables, logical expressions
Week 7	Arithmetic tools- priority of arithmetic and logical operations- illustrative examples
Week 8	Input and output order- Directing characters- Formatted console for input and output operations
Week 9	Completing the Formatted console for input and output operations- illustrative examples
Week 10	Conditional Statements (if statement- if-else statement-if-else-if statement-Compound if)
Week 11	Loop Statements (for-statement, while-statement- do-while statement-illustrative examples)
Week 12	Loop Statements (Nested Loop Statements- illustrative examples)
Week 13	One-Dimensional Arrays-illustrative examples
Week 14	Two- Dimensional Arrays- Operations on Arrays
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Steps to create, compile and implement a program using Microsoft visual C++ 6.0
Week 2	Lab 2: Implement programs for conditional statements (if-statement)
Week 3	Lab 3: Implement programs for conditional statements (switch-statement)
Week 4	Lab 4: Implement programs for Loop statements (for-statement)
Week 5	Lab 5: Implement programs for conditional statements (while-statement, do-while-statement)
Week 6	Lab 6: Implement programs for Array (one dimension)
Week 7	Lab 7: Implement programs for Array (two-dimension)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		No
Websites		

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	STRESSES ANALYSIS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical**	
Module Code	ME204				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGx11 UGII		**Semester of Delivery**	4	
Administering Department	ME		**College**	ER	
Module Leader	Dr. Kadhim M. Alsahlani		**e-mail**	KadhimAlsahlani@utq.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Kadhim M. Alsahlani		**e-mail**	KadhimAlsahlani@utq.edu.iq	
Peer Reviewer Name	Talib EH Elaikh		**e-mail**	Talib-h@utq.edu.iq	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Strength of Materials	**Semester**	Three
Co-requisites module		**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	The objective of analysis will be the determination of the stresses, strains, and deformations produced by the loads that applied on the solid bodies include axially-loaded bars, shafts, beams, and columns. A thorough understanding of the fundamentals of this subject is of vital importance because many of the formulas and rules of design		

	cited in engineering codes are based upon the principles of this subject. The aims of this module are: 19. To determine the stress distribution in beams including find the maximum bending stress and its location for better beam design. 20. Learn how to find the direct shear stress distribution in beams including the maximum shear stress and its location. 21. Describe the slope and deflection in beams using different methods like integration method or discontinuity method. 22. Discuss the stresses in the composite beams that made of two different materials. 23. Describe the stresses distribution in the curved beams and how to apply developed flexure formulas or combine stresses to design any curved member. 24. Identify combined stresses and study some of applications subject to combined loads e.g. shear, normal and bending load. 25. Explain the stresses at point using the mathematical equations or using Mohr's circle including find the principal stresses and the maximum shear stress with their orientations. 26. Define the columns support axile loads and their buckling formulas. 27. Identify the important failure theories that affect the design of the mechanical components.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By successfully completion of this module, the student will be expected to be able to: 1- Identify list of the various terms associated with stress analysis to design the mechanical components. 2- Determine the maximum bending stress and maximum shear stress and their locations along loaded beams. 3- Find the slope and deflection in loaded beans. 4- Design curved beam subjected to flexure or combine load. 5- Analysis stress at point to find the important mechanical properties which is critical for design like principals' stresses and maximum shear stresses. 6- Understand the buckling in columns. 7- Apply failure theories to design mechanical components.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Stresses in Beams and Shear Stresses in Beams. (7hours) Slope and Deflection in Beams by integration Method and by Discontinuity Method. (15 hours) Composite Beams. (6 hours) Curved Beams. (6 hours) Combine Stresses. (8 hours) Combine Stresses (6 hours) Stresses at Point, Mohr's Circle in Stress and Mohr's Circle in Strain. (15)

	Columns. (6 hours) Theories of Failure. (6 Hours)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some practical tests. Encourage students to solve some selected homework from refences to practice solving engineering problems using stresses analysis route.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	146 + 4 hours (Final exam) = 150 hours/sem		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4, 6	LO #2, 4 and 6
	Assignments	2	5% (5)	4, 14	LO # 3, 5, 8 and 14
	Report	1	10% (10)	Continuous	
	Projects / Lab.	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	30% (30)	8	LO # 1-7
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Stresses in Beams
Week 2	Stresses in Beams
Week 3	Shear Stresses in Beams
Week 4	Slope and Deflection in Beams by Integration Methods
Week 5	Slope and Deflection in Beams by Discontinuity Method
Week 6	Slope and Deflection in Beams by Discontinuity Method
Week 7	Composite Beams
Week 8	Curved Beams
Week 9	Combine Stresses
Week 10	Stresses at Point
Week 11	Moher's Circle for Stresses
Week 12	Moher's Circle for Strain
Week 13	Columns
Week 14	Theories of Failure
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Deflection of Simply Supported and Cantilever Beams
Week 2	Lab 1: Deflection of Simply Supported and Cantilever Beams
Week 3	Lab 2: Circular Bending in Beams
Week 4	Lab 2: Circular Bending in Beams
Week 5	Lab 3: Deflection of Curved Beams
Week 6	Lab 3: Deflection of Curved Beams

Week 7	Lab 4: Effect of End Conditions on Buckling Load
Week 8	Lab 4: Effect of End Conditions on Buckling Load
Week 9	Catch up
Week 10	Test

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	MECHANICS OF MATERIALS, Eighth Edition, R. C. Hibbeler	Yes
Recommended Texts	Mechanics of Materials, Singer Mechanics of Materials, Gere Mechanics of Materials, Hearn	No
Websites		

APPENDIX:

GRADING SCHEME
مخطط الدرجات

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

Note:

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

MODULE DESCRIPTOR 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**	
Module Code	ME201			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGx11 UGII		**Semester of Delivery**	3
Administering Department	ME		**College**	ER
Module Leader	Dr. Kadhim M. Alsahlani		**e-mail**	KadhimAlsahlani@utq.edu.iq

Module Leader's Acad. Title	lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Kadhim M. Alsahlani	e-mail	KadhimAlsahlani@utq.edu.iq
Peer Reviewer Name	Talib EH Elaikh	e-mail	Talib-h@utq.edu.iq
Review Committee Approval	01/06/2023	Version Number	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics	Semester	Two
Co-requisites module		Semester	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	Strength of materials is a branch of applied mechanics that deals with the behavior of solid bodies subjected to various types of loading. The aims of this subject are: 1- Recognize different types of loads that affects solid bodies include axially-loaded bars, shafts, beams, and columns. 2- Define Hook's law that linked the stress with its strain. 3- Identify the simple stresses in beams which include axile stress, shear stress produces by direct force and bearing stress. 4- Identify the strain including lateral and longitudinal strain and links with Poison ratio. 5- Discuss the effects of applying a torsional loading to a shaft or tube have a circular or noncircular cross section. 6- Determine the external forces and stresses by statically indeterminate methods. 7- Define power transmission by shaft subjected to torque. 8- Identify thin-walled pressure vessels including cylindrical and spherical shapes 9- Identify vessel subjected to fluid pressure 10-Learn how to draw bending and shear force diagrams that distributed along with beam's axle. 11-Explain the thermal stresses in beams that exposed to thermal effect beside the mechanical stresses. 12-Explain the combined stresses and angle of twist of thin-walled tubes having noncircular section subjected to combined loads		

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A thorough understanding of the fundamentals of this subject is of vital importance because many of the formulas and rules of design cited in engineering codes are based upon the principles of this subject. After completing this module, a student will be able to: 28. Recognize different types of loads and stresses that affect loaded beams. 29. Find external forces and stresses in beams that statically indeterminate since the equilibrium equation(s) are not sufficient. 30. Understand the stress distribution within the beam due to torsion load and identify the angle of twist of this beam having circular or noncircular section. 31. Use the statically indeterminate methods to find the reactions, stresses and deflections in beams subjected to torsional or axil loads. 32. Power Transmission in Beams Subjected to Torques. 33. Identify Thermal Stresses in Beams 34. Understand the Principals Design of Thin-Walled Tube and Thin-Walled Pressure Vessels. 35. Draw the Shear Force and Bending Moment Distributed Along the Beams. 36. Understand Combine Loads and the Stresses Result of Them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Materials properties includes modulus of elasticity, modulus of rigidity and Poison's ratio. Practical test includes tensile test (12hours). Simple Stresses, Normal Strain, Shear Stress and Bearing Stress, Shear Strain and Hook's. (15 hours) Statically indeterminate of Reactions, Deflections and Stresses. (5 hours) Torsion and Angle of Twist, Power Transmission and Statically Indeterminate, Torsion of Solid Noncircular Shaft, and Thin-Walled Tube having Close Cross Sections. (20 hours) Thin-Walled Pressure Vessels and Vessels Subjected to Fluid Pressure. (8 hours) Shear and Moment Diagrams by Sections Method, and Graphical Method for Constructing Shear and Moment Diagram. (15 hours)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering

	this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some practical tests. Encourage students to solve some selected homework from refences to practice solving engineering problems using stresses analysis route.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	146 + 4 hours (Final exam) = 150 hours/sem		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4, 10	LO #2, 4, 9 and 10
	Assignments	2	5% (5)	6, 12	LO # 3, 5, 11 and 12
	Report	1	10% (10)	Continuous	
	Projects / Lab.	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	30% (30)	8	LO # 1-7
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Simple Stresses and Normal Strain

Week 2	Shear Stress and Bearing Stress
Week 3	Shear Strain and Hook's Law
Week 4	Modulus of Rigidity and Pointon's Ratio
Week 5	Statically indeterminate of Reactions, Deflections and Stresses.
Week 6	Thermal Stresses
Week 7	Torsion and Angle of Twist
Week 8	**Midterm Exam**
Week 9	Power Transmission and Statically Indeterminate in Beams Subjected to Torsion Loads.
Week 10	Torsion of Solid Noncircular Shaft
Week 11	Thin-Walled Tube having Close Cross Sections.
Week 12	Thin-Walled Pressure Vessels and Vessels Subjected to Fluid Pressure.
Week 13	Shear and Moment Diagrams by Sections Method.
Week 14	Graphical Method for Constructing Shear and Moment Diagram
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Tensile Test
Week 2	Lab 1: Tensile Test
Week 3	Lab 2: Torsion test
Week 4	Lab 2: Torsion test
Week 5	Lab 3: Shear Centre in Unsymmetric Beams
Week 6	Lab 3: Shear Centre in Unsymmetric Beams
Week 7	Catch up
Week 8	Test

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	MECHANICS OF MATERIALS, Eighth Edition, R. C. HIBBELER	Yes
Recommended Texts	Mechanics of Materials, Singer Mechanics of Materials, Gere Mechanics of Materials, Hearn	No
Websites	https://classroom.google.com/u/0/h	

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	MATHEMATICS		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	ER201			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGx11 1		**Semester of Delivery**	3

Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Hayder Abdulhasan Lafta	**e-mail**	hayderlafta@utq.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Ahmed Shkara	**e-mail**	Ahmedshkara@utq.edu.iq
Review Committee Approval	12/06/2023	**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	15. To develop problem solving skills and understanding of mathematics theory through the application of techniques. 16. To understand how function of several variables. 17. This course deals with the basic concept of multivariable functions and its behavior. 18. This is the basic subject for partial derivatives and its applications. 19. To understand the derivative and integral problems. 20. To perform ordinary differential equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	37. Recognize how function of several variable works . 38. Discuss the various problems about the real numbers and equations of lines and inequalities. 39. Summarize what is meant by a basic Algebra. 40. Discuss the analysis of graphs of functions.

	41. Describe the series and its applications. 42. Define the ordinary differential equations. 43. Identify the basic of complex numbers. 44. Discuss the operations of integral and numeric integral. 45. Discuss the various problems of numerical solutions of O.D.E. 46. Explain the methods of Euler and Range Cuta.
Indicative Contents المحتويات الإرشادية	None
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction – functions of several variables.
Week 2	Limits partial derivatives
Week 3	Limits and continuity
Week 4	Directional Derivative
Week 5	Tangent plane and normal line extra
Week 6	Lagrange multipliers
Week 7	Double and triple integrals
Week 8	Double and triple integrals and its applications
Week 9	Complex numbers

Week 10	Series solutions and power series
Week 11	Ordinary differential equations
Week 12	Linear systems of differential equations
Week 13	Numerical method to solve O.D.E equations
Week 14	Euler and Range cuta method
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

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

Required Texts	Thomas, G.B., Finney, R.L., Weir, M.D. and Giordano, F.R., 2003. *Thomas' calculus*. Reading: Addison-Wesley.	Yes
Recommended Texts	Hornsby, J., Lial, M.L. and Rockswold, G.K., 2011. *A Graphical Approach to Algebra and Trigonometry*. Addison Wesley.	No
Websites		

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	THERMODYNAMICS	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME202		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGx11 2	**Semester of Delivery**	1

Administering Department	ME	**College**	ER
Module Leader	Dr. Mohammed D. Salman	**e-mail**	Dr.mohzaidi@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Prof.Dr.khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	21. Introducing the students to the laws of thermodynamics. 22. Identifying thermodynamic systems. 23. Understanding the phase change of material and apply it in producing energy. 24. Knowing the ideal and real gas laws and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	:Upon completion of the course student should be able to 47. Apply the acquired theoretical professional knowledge in thermodynamic engineering.

	48. Apply mathematical method in the analysis of closed , open and an isolated systems. 49. Explain phase change diagram of materials. 50. Derive the first law of thermodynamic to know the relation between heat and work and energy types. 51. Knowing thermodynamic processes for open and closed systems . 52. Analyze of steady and unsteady state processes in flow processes.
Indicative Contents المحتويات الإرشادية	Introduction, Definition / force / pressure, Energy / resource / uses, Heat / work / power, Internal energy / enthalpy / zeroth law, Temperature and its measurement, First law of thermodynamics / perpetual motion machine, Boyles law / Charles law, Equation of state / closed system processes, Constant volume pressure and processes, Adiabatic and polytrophic processes, Open system processes / steady flow energy equation , and its application.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encouraging student participation in thermodynamics exercises requires a combination of effective teaching strategies and engagement techniques specific to the subject matter. Here's a strategy to promote active participation in thermodynamics exercises: 1- Set clear learning goals and outcomes: • Clearly communicate the learning objectives of the thermodynamics exercises. • Explain the relevance of thermodynamics concepts to real-world applications, emphasizing their importance in various engineering fields. 2- Break down complex concepts:

	• Start with foundational concepts and gradually build up to more advanced topics • Use analogies, visual aids, and real-life examples to help students grasp abstract thermodynamics principles. • Provide step-by-step explanations and guide students through problem-solving techniques. 3- Provide regular feedback and guidance: • Offer constructive feedback on students' problem-solving approaches, highlighting both correct and incorrect methods. • Provide individualized guidance and support to address students' specific difficulties or misconceptions. • Encourage students to seek clarification or ask questions during exercises, creating an environment where they feel comfortable seeking help. 4- Relate thermodynamics to real-world applications: • Illustrate how thermodynamics concepts are applied in various engineering fields, such as energy systems, chemical processes, or environmental engineering. • Share case studies or success stories that demonstrate the practical significance of thermodynamics principles. • Assign exercises that require students to analyze and solve real-world thermodynamics problems, fostering engagement and motivation. 5- Assess and recognize student participation: • Implement formative assessments, such as quizzes or short exercises, to gauge students' understanding and progress. • Recognize and reward active participation, effort, and improvement in thermodynamics exercises. • Provide opportunities for students to showcase their understanding through presentations or demonstrations.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Basic Concepts & Definitions of Thermodynamics
Week 2	Phase-Change Processes of Pure Substances
Week 3	T-v, P-v & P-T Diagrams of Phase-Change Materials

Week 4	Property Tables of (Steam, Ammonia, R-12, R-22, R-134a & Nitrogen)
Week 5	The Ideal-Gas Equation of State & The Compressibility Factor
Week 6	Forms of Work
Week 7	Mechanical Work, Electrical Work & Heat Transfer
Week 8	The First Law of Thermodynamics for Closed Systems
Week 9	Internal Energy, Specific Heats, Enthalpy & Specific Heats
Week 10	The Continuity Equation
Week 11	The First Law of Thermodynamics for Control Volume (Open System)
Week 12	The First Law for Steady State-Steady Flow Process
Week 13	The First Law for Uniform State-Uniform Flow Process
Week 14	Unsteady state flow
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Thermal expansion of solid bodies Measuring using the expansion apparatus
Week 2	Lab 2: Observing the phase transition betweenthe liquid and the gas phase at the critical point
Week 3	Lab 3: Pressure-dependency of the volume of a gas at a constant temperature (Boyle-Mariotte's law)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Engineering Thermodynamics ,Borgnakke & Sonntag and Wiley	Yes
Recommended Texts	Thermodynamics: An Engineering Approach, 5/e, by Yunus A. Cengel and Michael A. Boles	No
Websites	https://eng.utq.edu.iq/	

APPENDIX:

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

Note:				

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	THERMODYNAMICS APPLICATIONS		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME206			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGx11 2	**Semester of Delivery**	2	
Administering Department	ME	**College**	ER	
Module Leader	Dr. Mohammed D. Salman	**e-mail**	Dr.mohzaidi@utq.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	Prof.Dr.khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq	
Review Committee Approval	01/06/2023	**Version Number**	1.0	

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	25. Introducing the students to the laws of thermodynamics. 26. Identifying thermodynamic systems. 27. Understanding the phase change of material and apply it in producing energy. 28. Identifying reversible and an irreversible processes.

	29. Finding thermal efficiencies of rankine cycle, air standard cycles and vapor refrigeration cycles. 30. Understanding entropy generation for the ideal gas.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	53. Apply the acquired theoretical professional knowledge in thermodynamic engineering. 54. Apply mathematical method in the analysis of closed , open and an isolated systems. 55. Explain phase change diagram of materials. 56. Know the Reversible and an irreversible process and application 57. Apply entropy change for ideal and real gas. 58. Explain The inequality of clausius application. 59. Analyze thermodynamically of steam power plants and refrigeration cycles. 60. Solve thermodynamic examples and do laboratory experiments as a team
Indicative Contents المحتويات الإرشادية	Reversible and in reversible processes, Heat engine / reversed heat engine, Heat pump, Second law of thermodynamics, Cycle / Carnot cycle, Reversed Carnot cycle, Entropy / clauses in quality, Entropy in reversed processes, Entropy in reversed processes with heat transfer, Entropy in irreversible processes, Entropy in irreversible processes with heat transfer, Gases mixtures / Dalton's law, Avogadro's law / adiabatic mixing of gases.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encouraging student participation in thermodynamics exercises requires a combination of effective teaching strategies and engagement techniques specific to the subject matter. Here's a strategy to promote active participation in thermodynamics exercises: 3- Set clear learning goals and outcomes:

	• Clearly communicate the learning objectives of the thermodynamics exercises. • Explain the relevance of thermodynamics concepts to real-world applications, emphasizing their importance in various engineering fields. 4- Break down complex concepts: • Start with foundational concepts and gradually build up to more advanced topics • Use analogies, visual aids, and real-life examples to help students grasp abstract thermodynamics principles. • Provide step-by-step explanations and guide students through problem-solving techniques. 3- Provide regular feedback and guidance: • Offer constructive feedback on students' problem-solving approaches, highlighting both correct and incorrect methods. • Provide individualized guidance and support to address students' specific difficulties or misconceptions. • Encourage students to seek clarification or ask questions during exercises, creating an environment where they feel comfortable seeking help. 4- Relate thermodynamics to real-world applications: • Illustrate how thermodynamics concepts are applied in various engineering fields, such as energy systems, chemical processes, or environmental engineering. • Share case studies or success stories that demonstrate the practical significance of thermodynamics principles. • Assign exercises that require students to analyze and solve real-world thermodynamics problems, fostering engagement and motivation. 5- Assess and recognize student participation: • Implement formative assessments, such as quizzes or short exercises, to gauge students' understanding and progress. • Recognize and reward active participation, effort, and improvement in thermodynamics exercises. • Provide opportunities for students to showcase their understanding through presentations or demonstrations.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Reversible and an irreversible process and application

Week 2	Introduction to the Second Law of Thermodynamics: Heat Engine, Refrigerator & Heat Pump
Week 3	Second law of thermodynamic application
Week 4	Entropy
Week 5	Principle of the Increase of Entropy
Week 6	Entropy Change of Ideal-Gas
Week 7	Reversible Steady-Flow Work
Week 8	The inequality of clausius application
Week 9	Adiabatic Efficiency of Steady-Flow Devices
Week 10	Gas Power Cycles; Otto Cycle & Diesel Cycle
Week 11	Ideal Brayton Cycle & Actual Brayton Cycle
Week 12	Vapor Power Cycles; Ideal Rankine Cycles & Actual Rankine Cycle
Week 13	Reheat Cycle
Week 14	Vapor Refrigeration Cycles; Ideal Vapor-Compression Refrigeration Cycle
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Determining the efficiency of the heat pump as a function of the temperature differential
Week 2	Lab 2: Vapor Refrigeration Cycle
Week 3	Lab 3: Determining the specific heat of water

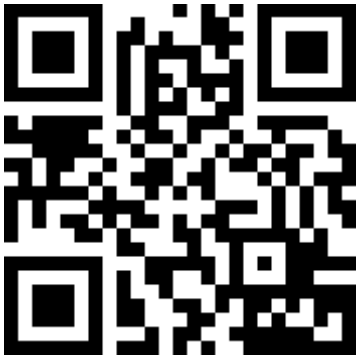
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Engineering Thermodynamics ,Borgnakke & Sonntag and Wiley	Yes
Recommended Texts	Thermodynamics: An Engineering Approach, 5/e, by Yunus A. Cengel and Michael A. Boles	No
Websites	https://eng.utq.edu.iq/	

APPENDIX:

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

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

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



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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	WIND ENERGY			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	MEE302				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	MEE		**College**	ER	
Module Leader	Dr. Ahmed jassim shkarah		**e-mail**	shkarah@utq.edu.iq	
Module Leader's Acad. Title	Assist.Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.ahmed ouda		**e-mail**	ouda1978@gmail.com	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introduction to Wind Energy: The aim of this module is to provide students with a broad understanding of wind energy as a renewable energy source. Students will learn about the basic principles of wind energy conversion, its advantages and limitations, and its role in global energy transition. 2. Wind Resource Assessment and Site Selection: This module aims to equip students with the knowledge and skills required to assess wind resources and select suitable sites for wind energy projects. Students will learn about wind data

	analysis, measurement techniques, and the factors influencing wind resource variability. They will also understand how to identify optimal locations for wind farms based on factors like wind speed, direction, and terrain characteristics. 3. Wind Turbine Technology and Design: The objective of this module is to provide students with a comprehensive understanding of wind turbine technology and design principles. Students will explore different types of wind turbines, their components, and their working mechanisms. They will also learn about the factors influencing turbine efficiency, power output, and reliability. 4. Wind Farm Planning and Development: This module focuses on the planning and development aspects of wind farms. Students will gain knowledge of the environmental impact assessment process, land use considerations, permitting requirements, and stakeholder engagement. They will also understand the importance of wind farm layout optimization and the integration of multiple turbines into a cohesive system. 5. Wind Energy Operations and Maintenance: The aim of this module is to familiarize students with the operations and maintenance practices involved in wind energy projects. Students will learn about monitoring and diagnostic techniques, preventive and corrective maintenance strategies, and safety protocols. They will also gain insights into the use of data analytics and remote sensing technologies for optimizing wind farm performance and minimizing downtime.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate a comprehensive understanding of the fundamental principles of wind energy, including the nature of wind, wind resource variability, and the conversion of wind energy into usable forms. 2. Apply wind resource assessment techniques and methodologies to analyze wind data, assess site suitability, and evaluate the potential of a given location for wind energy development. 3. Evaluate and compare different types of wind turbines, understand their components and working mechanisms, and analyze the factors influencing their efficiency, power output, and reliability.

	4. Design and optimize the layout of wind farms, considering factors such as wind resource distribution, spacing requirements, environmental impact, and stakeholder considerations. 5. Understand the challenges and strategies related to the integration of wind power into the electrical grid, including grid codes, power quality issues, and grid stability, and analyze the technologies and control systems used for efficient grid connection. 6. Analyze the economic and policy aspects of wind energy, including project financing, cost analysis, subsidy schemes, regulatory frameworks, and market dynamics, and evaluate the business models prevalent in the wind energy industry. 7. Apply project management principles and techniques to wind energy projects, including project planning, scheduling, risk management, stakeholder engagement, procurement, and environmental and social considerations. 8. Implement effective operations and maintenance practices for wind energy projects, including condition monitoring, maintenance strategies, troubleshooting, safety protocols, and the utilization of data analytics and predictive maintenance techniques. 9. Stay informed about emerging trends, innovations, and future directions in wind energy, including offshore wind, floating wind turbines, hybrid renewable energy systems, energy storage solutions, and potential integration with other sectors. 10. Demonstrate critical thinking and problem-solving skills by analyzing and addressing challenges related to wind energy, proposing innovative solutions, and making informed decisions based on technical, economic, and environmental considerations. 11. Communicate effectively about wind energy concepts, projects, and strategies, both orally and in written form, to technical and non-technical audiences, demonstrating clarity, coherence, and professionalism.

	12. Collaborate effectively in multidisciplinary teams, demonstrating the ability to work collaboratively, contribute ideas, and respect diverse perspectives, to achieve common goals in wind energy projects.
Indicative Contents المحتويات الإرشادية	1. Introduction to Wind Energy - Overview of renewable energy sources - Importance of wind energy in the global energy mix - Historical development and current trends in wind energy - Environmental and economic benefits of wind energy 2. Wind Resource Assessment - Wind data collection and analysis techniques - Wind speed and direction measurement devices - Statistical analysis and modeling of wind data - Micrositing and mesoscale wind resource assessment - Tools and software for wind resource assessment 3. Wind Turbine Technology - Types of wind turbines: horizontal axis and vertical axis - Components of a wind turbine: rotor, blades, nacelle, generator, etc. - Aerodynamics of wind turbine blades - Mechanical and electrical systems of wind turbines - Control systems and pitch regulation 4. Wind Farm Planning and Development - Site selection criteria and considerations - Environmental impact assessment and permitting process - Wind farm layout optimization and turbine positioning - Grid connection and electrical infrastructure requirements

	- Stakeholder engagement and community considerations 5. Wind Power Integration and Grid Connection - Grid integration challenges and solutions - Grid codes and power quality requirements - Voltage and frequency control in wind power systems - Reactive power compensation and voltage stability - Advanced grid connection technologies and control systems 6. Wind Energy Economics and Policy - Levelized Cost of Energy (LCOE) analysis - Project financing and financial models - Policy frameworks and regulatory incentives - Feed-in tariffs and renewable energy certificates - Market dynamics and business models in the wind energy industry 7. Wind Energy Operations and Maintenance - Monitoring and diagnostics techniques - Preventive and corrective maintenance strategies - Health and safety protocols for wind farm operations - Asset management and performance optimization - Role of data analytics and predictive maintenance 8. Emerging Trends and Future Directions - Offshore wind energy development - Floating wind turbines and deep-water installations - Hybrid renewable energy systems and wind-hydrogen integration - Energy storage solutions for wind power - Innovations in wind turbine design and materials

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Hands-on Practical Experience: Providing students with hands-on experience is invaluable for learning about wind energy. This can include field trips to wind farms, visits to turbine manufacturing facilities, or even setting up small-scale wind turbines on the school premises. Practical exposure allows students to observe and interact with real-life wind energy systems. 2. Interactive Demonstrations: Utilize interactive demonstrations to explain the principles of wind energy. Use models or virtual simulations to illustrate how wind turbines work, including concepts such as blade design, turbine components, and power generation. Encourage students to ask questions and participate actively during these demonstrations. 3. Multimedia Presentations: Utilize multimedia resources such as videos, animations, and presentations to explain complex concepts in wind energy. Visual aids can enhance understanding and engage students in the learning process. There are several online platforms where you can find educational videos specifically designed for teaching wind energy. 4. Project-Based Learning: Engage students in project-based learning activities that involve designing, building, and testing wind turbines. Assign them to work in groups and encourage problem-solving, critical thinking, and collaboration. This approach allows students to apply theoretical knowledge to practical scenarios, fostering a deeper understanding of wind energy principles. 5. Guest Lectures and Experts: Invite guest lecturers or industry experts to share their experiences and knowledge about wind energy. They can provide insights into the industry, advancements, challenges, and potential career paths. Students can learn from their expertise and gain a broader perspective on wind energy. 6. Research and Debates: Assign research projects or debate topics related to wind energy. Encourage students to explore current issues, innovations, environmental impacts, policy considerations, and economic factors associated

	with wind energy. Research projects and debates promote critical thinking, analysis, and effective communication skills. 7. Fieldwork and Data Analysis: Conduct fieldwork activities where students collect data related to wind patterns, wind speeds, and other relevant parameters. They can then analyze and interpret the data to draw conclusions about the viability and efficiency of wind energy systems. This approach combines practical experience with data analysis skills. 8. Online Resources and Platforms: Explore online platforms and resources dedicated to wind energy education. These may include websites, online courses, educational modules, or virtual laboratories. Such resources can provide interactive learning materials, quizzes, and assessments to track students' progress.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	84	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	History and development of wind energy
Week 2	Wind Energy Fundamentals
Week 3	Wind Turbine Technology
Week 4	Wind Resource Assessment
Week 5	Wind Turbine Performance Analysis
Week 6	Wind Farm Design and Layout
Week 7	Wind Power Conversion Systems
Week 8	Grid Integration of Wind Energy
Week 9	Wind Energy Economics
Week 10	Environmental and Social Impacts
Week 11	Offshore Wind Energy

Week 12	Wind Energy Policy and Regulations
Week 13	Emerging Trends in Wind Energy
Week 14	Project Presentations and Review
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Introduction to wind energy systems and lab equipment
Week 2	Lab 2: Wind speed measurement techniques
Week 3	Lab 3: Anemometer calibration and setup
Week 4	Lab 4: Wind Turbine Performance Testing
Week 5	Lab 5: Power output measurement and analysis
Week 6	Lab 6: Wind Farm Layout Optimization
Week 7	Lab 7: Grid connection requirements and standards

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

Recommended Texts	"Wind Energy Explained: Theory, Design and Application" by James F. Manwell, Jon G. McGowan, and Anthony L. Rogers.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ENGINEERING AND NUMERICAL ANALYSES			**Module Delivery**	
Module Type	BASIC			**Theory** **Lecture** **Tutorial** **Practical** **Seminar**	
Module Code	ME 301				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level	UGx11 1		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Ammar alwan sywan		**e-mail**	Ammaralwan76@yahoo.com	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr. rafid hannun		**e-mail**		
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	31. Understand what the differential equation means. 32. A - A statement of how the differential equation is formed and its importance in modeling reality 33. P - We explain to the students the concept of order and degree of the differential equation 34. Explain to students the classification of differential equations for linear and nonlinear equations 35. 4 Explain the importance of this classification in solving differential equations 36. A Focus on methods of solving ordinary equations of the first and second order 37. Clarification of the concept of the general and specific solution. And the clarification of the concept of boundary conditions and initial conditions. How do we define the specific solution according to the surrounding conditions of the system under study? 38. We study applications on differential equations of the first and second order. Mechanical applications are close to the students' academic courses. fluid and material resistance		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	61. After the course, the student will be able to know the difference between the ordinary equation and the differential equation. 62. The student is able to classify equations according to rank and degree 63. P is able to classify linear and nonlinear equations 64. 4 Know how to solve ordinary linear equations of the first and second order 65. The ability to find the general solution and apply the boundary and initial conditions to find the specific solution 66. The ability to model a specific system and find the governing differential equation and find a solution to it by applying the condition		
Indicative Contents			

المحتويات الإرشادية	Indicative content includes the following. Part A FIRST ORDER 1- Definition of differential equation. Classification of differential equations. In terms of grade and rank. And linear and non-linear. (4 hours h) Solve equations of the first order by separating variables and the homogeneous equation method. And the complete equation method. And the linear equation. Finding the general and specific solution and mechanical applications on equations (28 hours) PART B SECOND ORDER A Classification of equations of the second order. Solving equations of the second order for homogeneous and inhomogeneous. Linear, finding a general and specific solution, applying boundary and initial conditions, and mechanical applications (28 hours)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	We try to activate and increase the motivation of students by linking the material to practical reality. And explain the importance of differential equations in modeling any system to become a mathematically solvable case: Involve the students in the topic in the classroom by presenting a problem and trying to solve it together. Discussing the students' solutions and pointing out the strengths and weaknesses. Assigning students to do homework in order to practice and consolidate skills Assigning students to a semester project that includes the entire course in order to show the student's knowledge of the material

Student Workload (SWL)

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	157	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	98	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

As		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
		0	0% (0)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction – Definition of differential equations: classification by degree , order and linearity
Week 2	First order ordinary differential equations :separable variables

Week 3	Homogeneous differential equations(reducible to separable D E)
Week 4	Equations non homogeneous reducible to homogeneous D E
Week 5	Exact differential equation
Week 6	Equations not exact reducible to exact D E
Week 7	Linear differential equations, Equations nonlinear reducible to linear differential equations
Week 8	Applications on first order D E
Week 9	Second and higher order linear O D E:Introduction ,superposition principle
Week 10	Solution of homogenous linear DE with constant coefficients
Week 11	Solution of non-homogenous linear DE with constant coefficients.1-unetermined coefficients method
Week 12	2- Variation of parameters method
Week 13	Solution of some linear D E with variable coefficients. Euler and legender equation
Week 14	Applications on second and higher order linear O D E
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Text book of engineering mathematics .by Debashis datta	Yes

Recommended Texts	Advanced math for engineers an scientists .by murray R. spiegel	No
Websites		

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	GAS POWER PLANTS	**Module Delivery**
Module Type	CORE	**Theory** **Lecture** **Tutorial** **Practical** **Seminar** **Lab**
Module Code	MEE406	
ECTS Credits	5	
SWL (hr/sem)	125	

Module Level		UGx11 8	**Semester of Delivery**		2
Administering Department		ME	**College**	ER	
Module Leader	Dr. Rafid M. Hannun		**e-mail**	Rafid-m@utq.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name		Dr. Khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq	
Review Committee Approval		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	39. To develop problem solving skills and understanding of gas power plant cycles through the application of techniques. 40. To understand gas, and renewable power plants cycles. 41. This course deals with the advanced concept of power plants cycles. 42. This is the basic subject for all power stations accessories and apparatus. 43. To understand Brayton cycle. 44. To know the combustion chamber, compressor types work.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	67. Recognize how power plants work. 68. List the various terms associated with power plants. 69. Summarize what is meant by a power plants. 70. Discuss the relation among different apparatus in power plant. 71. Describe work, power, velocity, enthalpy etc for many power stations. 72. Define Brayton cycles. 73. Identify the basic plant apparatus and their applications. 74. Discuss the operations of power stations. 75. Discuss the various properties of compressor, combustion chamber, gas turbine, renewable energy power plants.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Gas and renewable power plants Gas turbine power plant principles, Classification of gas turbine and operation, [12 hrs] Air compressor (classification and operation), Axial compressors, Centrifugal compressors, [12 hrs] Combustion chamber principles, Combustion chamber efficiency and performance [6 hrs] Nuclear power plants principles, Operation of nuclear power plants, Classification of nuclear power plants, Pressurized water reactor (PWR), Boiling water reactor (BWR) [12 hrs] Hydropower plants principles, Hydropower plants operation, Nonconventional power plants. [12 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials inside the classroom and outside (homework) and by considering type of simple experiments involving some sampling activities that are interesting to the students. Also, 1. Integrating formative assessment strategies in classroom. 2. Advancing critical thinking skills by using graphic organisers to help students organise their thinking. 3. Provide playful learning experiences that promote divergent thinking. 4. Utilise dual coding methods to make curriculum content easier to understand. 5. Integrate responsive teaching as a whole school philosophy.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to power plant cycles

Week 2	Gas turbine power plant principles,
Week 3	Classification of gas turbine and operation
Week 4	Air compressor (classification and operation),
Week 5	Axial compressors,
Week 6	Centrifugal compressors
Week 7	Combustion chamber principles, Combustion chamber efficiency and performance
Week 8	Nuclear power plants principles,
Week 9	Operation of nuclear power plants,
Week 10	Classification of nuclear power plants, Pressurized water reactor (PWR), Boiling water reactor (BWR)
Week 11	Hydropower plants principles,
Week 12	Hydropower plants operation,
Week 13	Nonconventional power plants (wind)
Week 14	Nonconventional power plants (solar)
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	NO LAB

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thermal Engineering by R.K. Rajput	Yes
Recommended Texts	1-Power Plant System Design by Kam W.Li and A. Paul Priddy 2- Power Plant Technology by El-Wakil M.M. 3- Power Generation Handbook by Philip Kiameh 4- Thermodynamic Fundamentals by Eistop	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	STEAM POWER PLANTS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Tutorial** **Practical** **Seminar** **Lab**	
Module Code	MEE404				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGx11 7	**Semester of Delivery**		1
Administering Department		ME	**College**		ER
Module Leader	Dr. Rafid M. Hannun		**e-mail**	Rafid-m@utq.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	None	

Peer Reviewer Name	Dr. Khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq
Review Committee Approval	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	45. To develop problem solving skills and understanding of power plant cycles through the application of techniques. 46. To understand steam power plants cycles. 47. This course deals with the advanced concept of power plants cycles. 48. This is the basic subject for all power stations accessories and apparatus. 49. To understand Rankine, superheated, regenerative cycles. 50. To know the boiler, turbine, pump work.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	76. Recognize how power plants work. 77. List the various terms associated with power plants. 78. Summarize what is meant by a power plants. 79. Discuss the relation among different apparatus in power plant. 80. Describe work, power, velocity, enthalpy etc for many power stations. 81. Define Rankine cycles. 82. Identify the basic plant apparatus and their applications. 83. Discuss the operations of power stations. 84. Discuss the various properties of boiler, superheater, reheater, feed water heaters, water pump, condenser, cooling tower, steam turbine, power plants. 85. Identify the power costs and their definitions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to power plant cycles, Power system Economics, Rankine cycle [18 hrs]

	Power station superheated processes, Power station reheated processes, Power station regenerative processes, Open feed water – close backward feed water, close forward heater. [12 hrs] Boiler operation (water tube, fire tube), Water circulation in boiler [12 hrs] Steam turbine, impulse turbine, Reaction turbine condensers [24 hrs] Circulation of water system, Cooling tower classification, Cooling tower operation, Pumping system [6 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials inside the classroom and outside (homework) and by considering type of simple experiments involving some sampling activities that are interesting to the students. Also, 6. Integrating formative assessment strategies in classroom. 7. Advancing critical thinking skills by using graphic organisers to help students organise their thinking. 8. Provide playful learning experiences that promote divergent thinking. 9. Utilise dual coding methods to make curriculum content easier to understand. 10. Integrate responsive teaching as a whole school philosophy.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.6
Unstructured SWL (h/sem)	61	**Unstructured SWL (h/w)**	4.4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to power plant cycles
Week 2	Power system Economics
Week 3	Rankine cycle
Week 4	Power station superheated processes
Week 5	Power station reheated processes

Week 6	Power station regenerative processes,
Week 7	Open feed water – close backward feed water
Week 8	close forward heater Boiler operation (water tube, fire tube),
Week 9	Water circulation in boiler Steam turbine,
Week 10	Impulse turbine
Week 11	Reaction turbine
Week 12	condensers Circulation of water system
Week 13	Cooling tower classification,.
Week 14	Cooling tower operation Pumping system
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	NO LAB

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thermal Engineering by R.K. Rajput	Yes
Recommended Texts	1-Power Plant System Design by Kam W.Li and A. Paul Priddy 2- Power Plant Technology by El-Wakil M.M. 3- Power Generation Handbook by Philip Kiameh 4- Thermodynamic Fundamentals by Eistop	No
Websites		

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

Note:

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	PRINCIPLES OF RENEWABLE ENERGY		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Tutorial** **Practical** **Seminar** **Lab**	
Module Code	MEE306			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGx11 5	**Semester of Delivery**	1	
Administering Department	ME	**College**	ER	
Module Leader	Dr. Rafid M. Hannun	**e-mail**	Rafid-m@utq.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	

Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq
Review Committee Approval	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	51. To develop problem solving skills and understanding of principles of renewable energy through the application of techniques. 52. To understand renewable cycles. 53. This course deals with the advanced concept of renewable energy. 54. This is the basic subject for many renewable shapes (accessories and apparatus). 55. To understand the energy kinds, solar power, nuclear energy, water energy, ocean, crops, wind energies. 56. To know the good design for sustainable components. 57. To know the difference between the renewable energies and nonrenewable.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	86. Recognize how renewable energy systems work. 87. List the various terms associated with sustainable design. 88. Summarize what is meant by a renewable, green, sustainable. 89. Discuss the relation among different apparatus in renewable systems. 90. Describe work, power, energy etc for many types of energy. 91. Define energy cycles. 92. Identify the basic energy apparatus and their applications. 93. Discuss the operations of sustainable systems. 94. Discuss the various properties of solar, crops, ocean, wind, water, wind and fossil fuel.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to renewable energy [6 hrs]

	Introduction to energy systems and resources [6hrs] Energy [6 hrs] Sustainability & the environment[6 hrs] Quantifying energy & energy arithmetic [6 hrs] Heat to motive power[6 hrs] Electricity a primer[6 hrs] Fossil fuels - past, present & future [6 hrs] Remedies & alternatives for fossil fuels, [6 hrs] CHP/cogeneration, Energy efficiency and conservation. [12hrs]

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 inside the classroom and outside (homework) and by considering type of simple experiments involving some sampling activities that are interesting to the students. Also, 11. Integrating formative assessment strategies in classroom. 12. Advancing critical thinking skills by using graphic organisers to help students organise their thinking. 13. Provide playful learning experiences that promote divergent thinking. 14. Utilise dual coding methods to make curriculum content easier to understand. 15. Integrate responsive teaching as a whole school philosophy.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.6
Unstructured SWL (h/sem)	36	**Unstructured SWL (h/w)**	2.6

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to renewable energy
Week 2	Introduction to energy systems
Week 3	Energy resources
Week 4	Energy shapes
Week 5	Energy calculations

Week 6	Sustainability & the environment
Week 7	Quantifying energy & energy arithmetic
Week 8	Heat to motive power
Week 9	Electricity a primer
Week 10	Fossil fuels - past, present & future
Week 11	Remedies & alternatives for fossil fuels
Week 12	CHP/cogeneration,
Week 13	Energy efficiency and conservation.
Week 14	Sustainable energy components
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Solar PV panel experiment
Week 2	Solar power experiment
Week 3	Wind power experiment
Week 4	Watering by wind energy experiment
Week 5	Evaporation of water in still experiment
Week 6	Solar flat plate collector experiment
Week 7	Vacuum tube collector experiment

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Principles of Solar energy by Rafid M. Hannun and Muhammed H.Khalaf 2- Principles of Renewable energy by Rafid M. Hannun and Muhammed H.Khalaf	Yes
Recommended Texts	1- RENEWABLE ENERGY A First Course by Robert Ehrlich 2- Biofuels Engineering Process Technology by Caye M. Drapcho et al. 3- Biofuel's Engineering Process Technology by Marco Aurélio and Dos Santos	No
Websites	Renewable Energy Resources by John Twidell and Tony Weir	

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	RENEWABLE ENERGY	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Tutorial** **Practical** **Seminar** **Lab**	
Module Code	MEE303		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGx11 6	**Semester of Delivery**	2

Administering Department	ME	**College**	ER
Module Leader	Dr. Rafid M. Hannun	**e-mail**	Rafid-m@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq
Review Committee Approval	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	58. To develop problem solving skills and understanding the renewable energy through the application of techniques. 59. To understand renewable cycles. 60. This course deals with the advanced concept of renewable energy. 61. This is the basic subject for many renewable shapes (accessories and apparatus). 62. To understand the energy kinds, solar power, nuclear energy, water energy, ocean, crops, Wave & tidal, Geothermal, wind energies. 63. To know the good design for sustainable buildings. 64. To know the difference between the conventional and nonconventional fuel. 65. To study some biofuels and remedies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	95. Recognize how renewable energy systems work. 96. List the various terms renewable design. 97. Summarize what is meant by a biofuels and remedies. 98. Discuss the relation among different apparatus in renewable systems. 99. Describe many method for biofuel production. 100. Define the difference between many types of biofuels. 101. Identify the bioenergy apparatus from waste. 102. Discuss the operations of biomass and biofuel systems. 103. Discuss the various properties of batteries and inverters.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Nuclear energy [6 hrs] Green building and Sizing residential systems [6 hrs] Wave & tidal energy [2 hrs] Geothermal energy [2 hrs] Batteries and Inverters [2 hrs] Governmental incentives [2 hrs] Biomass & Biofuels overview [6 hrs] Biogas - anaerobic digesters [6 hrs] Bioenergy from wastes [6 hrs] Dedicated bioenergy crops [2 hrs] Woody biomass Liquid [2 hrs] Biofuels [4 hrs] Ethanol - issues & future prospects [2 hrs] Biodiesel - uses, production, processes [2 hrs] Biomass & Bioenergy wrap-up [2 hrs] Transportation – hybrids [4 hrs] Flex fuels [2 hrs] Fuel cells[6 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials inside the classroom and outside (homework) and by considering type of simple experiments involving some sampling activities that are interesting to the students. Also, 16. Integrating formative assessment strategies in classroom.

	17. Advancing critical thinking skills by using graphic organisers to help students organise their thinking. 18. Provide playful learning experiences that promote divergent thinking. 19. Utilise dual coding methods to make curriculum content easier to understand. 20. Integrate responsive teaching as a whole school philosophy.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2 and 9
	Assignments	3	10% (10)	2, 7, 12	LO # 3, 6 and 8

	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Nuclear energy
Week 2	Green building and Sizing residential systems
Week 3	Wave & tidal energy
Week 4	Geothermal energy
Week 5	Batteries and Inverters
Week 6	Governmental incentives
Week 7	Biomass & Biofuels overview
Week 8	Biogas - anaerobic digesters
Week 9	Bioenergy from wastes
Week 10	Dedicated bioenergy crops, Woody biomass Liquid
Week 11	Biofuels, Ethanol - issues & future prospects
Week 12	Biodiesel - uses, production, processes, Biomass & Bioenergy wrap-up
Week 13	Transportation – hybrids
Week 14	Flex fuels, fuel cells
Week 15	**Preparatory Week**

Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Sunlight angles experiment
Week 2	Solar PV panel experiment
Week 3	Wind angles experiment
Week 4	Hydropower experiment
Week 5	Desalination of water experiment
Week 6	Mechanical energy from the sun experiment
Week 7	Biofuel production experiment

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	3- Principles of Solar energy by Rafid M. Hannun and Muhammed H.Khalaf 4- Principles of Renewable energy by Rafid M. Hannun and Muhammed H.Khalaf	Yes
Recommended Texts	4- RENEWABLE ENERGY A First Course by Robert Ehrlich 5- Biofuels Engineering Process Technology by Caye M. Drapcho et al. 6- Biofuel's Engineering Process Technology by Marco Aurélio and Dos Santos	No

Websites	Renewable Energy Resources by John Twidell and Tony Weir

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	TECHNICAL ENGLISH	**Module Delivery**	
Module Type	SUPLEMENT	**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	UR 301		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGx11 3	**Semester of Delivery**	6

Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Sarah Rabeea Nashee	**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	Sara.rabee@utq.edu.iq
Peer Reviewer Name	Ahmed j. Shkara	**e-mail**	
Review Committee Approval	03/06/2023	**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	4. To develop students' English language skills 5. To strengthen speaking and listening in English 6. Facilitate the learning of engineering specialization by mastering the English language to accept many educational resources related to engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	5. Develops speaking and discussion skills in English 6. The ability to form complete sentences in different tenses and to suit the dialogue time 7. Writing formal and informal letters 8. Mastering English grammar with the correct spelling of words
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Tenses The first part is the tenses and the grammar of the tenses How to build sentences in all tenses in accordance with the rules of the English language for each tense 6 hours

	Writing the essay or article Its purpose is to learn to write a composition according to the formulas given and the rules of the English language With a daily exam 4 hours Voices Learn to pronounce English words and the rules followed for pronunciation with a daily exam 4 hours The questions Study the structure of the affirmative sentence through the affirmative question With daily exam and homework 2 hours Question tag A detailed lecture on all interrogative tools, interrogative methods, and how to formulate an interrogative sentence 2 hours The passive and the active voices How to convert between the two sentences according to five rules With homework in two stages The first is to give a sentence for each rule, and the second is to transfer the sentences given as homework from the active voice to the passive voice 4 hours

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	102	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	98	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	none			
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All

Total assessment	100% (100 Marks)		

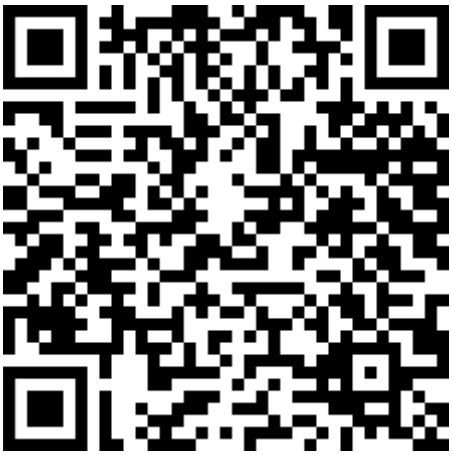
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	The tenses (present and past simple tense and future) L1
Week 2	The tenses (perfect tenses (present an past perfect tens) L2
Week 3	Present continuous tense L3
Week 4	Writing the essay or article L1
Week 5	Writing the essay or article l2
Week 6	Voices L1
Week 7	Voices L2
Week 8	Mid-term Exam
Week 9	The equations
Week 10	Question tag
Week 11	Active voice
Week 12	Passive voice
Week 13	The introducing L1
Week 14	The introducing L2
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	English Grammar, Raymond murfy, 1985	no
Recommended Texts	English structure 2020, dissidents.	No
Websites	https://www.examveda.com/competitive-english/practice-mcq-question-on-grammar/	

APPENDIX:

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

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



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

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	SOLAR ENERGY	**Module Delivery**
Module Type	CORE	**√ Theory** **√ Lecture**
Module Code	MEE302	

ECTS Credits	7	√**Tutorial** **Practical** **Seminar**	
SWL (hr/sem)	175		

1 **Module Level**	UGIII	**Semester of Delivery**	Six
Administering Department	ME	**College**	ER
Module Leader	ghassan adnan	**e-mail**	Ghassanadnan77@uobaghdad.edu.iq
Module Leader's Acad. Title	Asst.prof	**Module Leader's Qualification**	M.Sc
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	

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 understand solar energy, and The sun as source of energy.** **2- This course deals with the basic concept of Electromagnet (EM) Spectrum of sun radiation.** **3- Earth Motion is the important subject to study to be able understand solar radiation .** **4- Analysis the Solar angles that effect the solar radiation** **5- To understand Hourly Total Solar Radiation Flux Incident Surfaces.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Understanding Solar Energy Fundamentals: Students w gain a comprehensive understanding of the principles a concepts related to solar energy** **2. Discuss Earth Motion and it effect on the solar energy** **3. Summarize the Solar angles and how to calculate of the** **4. Discuss Liner momentum Equation, Applications of momentum principle.** **5. Explain Sunrise and Sunset times and day length** **6. Identify Hourly Total Solar Radiation Flux Incident or Surfaces**

Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** **1- Introduction to solar energy, The sun, Electromagneti (EM) Spectrum .[15 hrs]** **2- Earth Motion. reckoning of time, Longitude Correction [hrs]** **3- Solar angles, Declination angle, The Hour Angle, Solar Altitude Angle, solar zenith angle, Solar Azimuth Angl Optimum tilt angle of a surface, incidence Angle. [10 hr** **4- Sunrise and Sunset times and day length. [10 hrs]** **5- [5 hrs]** **6- Hourly Total Solar Radiation Flux Incident on Surfaces, so constant, Direct (beam) Solar Radiation, Diffuse Solar Radiation from Sky, Solar Radiation Reflected from the Grou [15 hrs]**
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**The sun has a great influence on man and the earth, and since this course deals with the movement of the sun and the effect of its radiation on the earth, encouraging the student to follow this movement and its change on the solar radiation reaching us and the effect of the monitoring site on this radiation**

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (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 Learnin Outcome
Formative assessment	Quizzes	2	10% (10)	3, 8	LO #1
	Assignments	2	10% (10)	4, 9	LO # 1,2,3,
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 4,5
Summative assessment	Midterm Exam	2 hr	10% (10)	10	LO # 1-5
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to solar energy, The sun
Week 2	Electromagnetic (EM) Spectrum
Week 3	Earth Motion
Week 4	reckoning of time, Longitude Correction
Week 5	Solar angles, Declination angle
Week 6	The Hour Angle, Solar Altitude Angle
Week 7	solar zenith angle, Solar Azimuth Angle
Week 8	Optimum tilt angle of a surface, incidence Angle
Week 9	Sunrise and Sunset times and day length
Week 10	Mid-term Exam
Week 11	Hourly Total Solar Radiation Flux Incident on Surfaces, solar constant
Week 12	Direct (beam) Solar Radiation
Week 13	Diffuse Solar Radiation from Sky
Week 14	Solar Radiation Reflected from the Ground
Week 15	Preparatory Week
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Experiment 1: Solar angles: Declination angle, Solar Azimuth Angle**
Week 2	**Experiment 2: Solar angles: Optimum tilt angle of a surface, incidence Angle**
Week 3	**Experiment 3: calculation of Sunrise and Sunset times and day length**
Week 4	**Experiment 4: Total Solar Radiation**
Week 5	**Experiment 5: ADVANCED THERMAL ENERGY SYSTEM**
Week 6	**Experiment 6: Advanced Photovoltaic Energy system**
Week 7	**Final Exam**

√

Learning and Teachمصادر التعلم والتدريس	
	Text
Required Texts	**Principles of SOLAR ENGINEERING, D. Yogi Goswami**
Recommended Texts	**Solar Energy Engineering - Processes and Systems 2009 , Malestrom**
Websites	https://alison.com/tag/solar-energy?utm_source=google&utm_medium=cpc&utm_campaign=Performance I&gclid=Cj0KCQjw7PCjBhDwARIsANo7CgnLeF7PnZ4ih1ReIr5Wmzeh8QGp_7qla1GN

APPENDIX:

GRADING SCHEMEمخطط 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	مقبول بقرار	(45-49)	More work required but credit awarded

(0 – 49)	**F** – Fail	راسب	(0-44)	Considerable amount of work requir
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condo "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic roundi outlined above.

Module Leader's

Asst.Prof. Ghassan adnan

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	REFRIGERATION			Module Delivery
Module Type	CORE			Theory
Module Code	ME408			Lecture
ECTS Credits	5			Lab
SWL (hr/sem)	125			Tutorial
				Practical
				Seminar
Module Level	UGx11 4	Semester of Delivery	7	
Administering Department	Mechanical	College	Engineering	
Module Leader	Prof. Dr. Mushtaq I. Hasan	e-mail	mushtaq@utq.edu.iq	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	None	e-mail	None	
Peer Reviewer Name	Dr. Ahmad shkarah	e-mail	@uobaghdad.edu.iq	
Review Committee Approval	01/06/2023	Version Number	1.0	

Relation with Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	66. Teaching students the principles of fan work and fan calculations. 67. Teaching students the principles of piping systems. 68. Teaching students how to design piping system. 69. Teaching students the principles of refrigeration. 70. Teaching students the required calculations of refrigeration system and designing the refrigeration system of different types.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	104. Identify the basics of fans, pumps, piping and piping system. 105. The student will be familiar with fan and pump selection. 106. Ability to design piping system. 107. The student will be familiar with different refrigeration systems. 108. The student will be able to design the refrigeration systems of different types.
Indicative Contents المحتويات الإرشادية	Fans Design of piping system Introduction to refrigeration Carnot engine & ravines Carnot cycle Ideal & actual vapors compression refrigeration cycle Ideal &actual vapors compression refrigeration cycle Compound vapors compression refrigeration cycle refrigerants refrigeration system components Absorption refrigeration system
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning strategy will be focus on teaching the students the main principles of subject and make them familiar with it and able to analysis and design the air conditioning and ducting systems of different types. The strategy also includes present applications and applied examples to make students in contact with real applications of subject.

Student Workload (SWL) الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Fans
Week 2	Piping systems
Week 3	Design of piping system

Week 4	Introduction to refrigeration
Week 5	Carnot engine
Week 6	Revers Carnot cycle
Week 7	Ideal & actual vapors compression refrigeration cycle
Week 8	Ideal &actual vapors compression refrigeration cycle
Week 9	Compound vapors compression refrigeration cycle
Week 10	refrigerants
Week 11	refrigeration system components
Week 12	refrigeration system components
Week 13	**Absorption refrigeration system**
Week 14	**Absorption refrigeration system**
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Refrigeration cycle
Week 2	Lab 2: refrigeration cycle components
Week 3	Lab 3: vehicle air conditioning system
Week 4	Lab 4: absorption refrigeration cycle
Week 5	
Week 6	

Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Dr. Fundamentals of Air conditioning and refrigeration Al-Qadisiya 1st Abbas A. S. Al - Jeebori 2006 university	Yes
Recommended Texts	مبادئ هندسه تكييف الهواء والتثليج الدكتر خالد احمد الجودي كليه الهندسه – جامعه البصره 1986	yes
Websites	https://www.youtube.com/channel/UCu9Puth4dyEiUC6tsIG4P1w/videos	

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	AIR CONDITIONING	**Module Delivery**
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial**
Module Code	ME402	
ECTS Credits	5	
SWL (hr/sem)	125	

		Practical **Seminar**	
Module Level	UGx11 4	**Semester of Delivery**	7
Administering Department	Mechanical	**College**	Engineering
Module Leader	Prof. Dr. Mushtaq I. Hasan	**e-mail**	mushtaq@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Ahmad shkarah	**e-mail**	@uobaghdad.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation with Other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	71. Teaching students the principles of air conditioning. 72. Teaching students how to design cooling and heating systems and how to calculate thermal loads. 73. Teaching students the principles of ducting systems. 74. Teaching students the duct design methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	109. Identify the basics of air conditioning. 110. The student will be familiar with comfort conditions and how human body react with heat and environment. 111. Ability to calculate cooling and heating loads. 112. Ability to design air conditioning systems. 113. The student will be familiar with ducting systems.

	114. The student will be able to design the duct systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to AC & measuring unit Properties of moist air Humidity calculations & Dalton's law Humidity calculations & Dalton's law Psychrometric chart & Psychrometric process Air mixing Heat transfer principles Overall heat transfer coefficient & wall surface temperature Comfort conditions Comfort conditions Cooling load calculation Cooling load calculation Cooling load calculation Cooling load calculation Heating load calculations Heating load calculations Fluid flow through ducts and air distribution Fluid flow through ducts and air distribution Duct design (pressure drop method, velocity method, static regain method) Duct design (pressure drop method, velocity method, static regain method)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning strategy will be focus on teaching the students the main principles of subject and make them familiar with it and able to analysis and design the air conditioning and ducting systems of different types. The strategy also includes

	present applications and applied examples to make students in contact with real applications of subject.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Introduction to AC & measuring unit**
Week 2	**Properties of moist air**
Week 3	**Humidity calculations & Dalton's law**
Week 4	**Humidity calculations & Dalton's law**
Week 5	**Psychrometric chart & Psychrometric process**
Week 6	**Air mixing**
Week 7	**Heat transfer princeples**
Week 8	**Comfort conditions**
Week 9	**Cooling load calculation**
Week 10	**Cooling load calculation**
Week 11	**Heating load calculations**
Week 12	**Fluid flow through ducts and air distribution**
Week 13	**Duct design(pressure drop method, velocity method, static regain method)**
Week 14	**Duct design (pressure drop method, velocity method, static regain method)**
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Psychrometric process (process 1 + process2)
Week 2	Lab 2: Psychrometric process (process 3 + process4)
Week 3	Lab 3: Humidity calculations
Week 4	Lab 4: Humidity calculations
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Dr. Fundamentals of Air conditioning and refrigeration Al-Qadisiya 1st Abbas A. S. Al - Jeebori 2006 university	Yes
Recommended Texts	مبادئ هندسه تكييف الهواء والتثليج الدكتر خالد احمد الجودي كليه الهندسه – جامعه البصره 1986	yes
Websites	https://www.youtube.com/channel/UCu9Puth4dyEiUC6tsIG4P1w/videos	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition

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

Note:

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

Ministry of Higher Education and Scientific Research - Iraq

University of Thi-Qar

College of Engineering

Department of Mechanical Engineering

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	ENGINEERING ETHICS AND COMMUNICATIONS	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 401		
ECTS Credits	2		
SWL (hr/sem)	50		

Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Mustafa M. Mansor	**e-mail**	Mustafa.muhammedali @utq.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

Module Aims أهداف المادة الدراسية	This module aims to develop students' deeper understanding of Engineering Ethics, following the Royal Academy of Engineering approach. The study of engineering ethics within an engineering course helps students prepare for their professional lives. A specific advantage for engineering students who learn about ethics is that they develop clarity in their understanding and thought about ethical issues and the practice in which they arise. The study of ethics helps students to develop widely applicable skills in communication, reasoning and

	reflection. These skills enhance students' abilities and help them engage with other aspects of the engineering programme such as group work and work placements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply and conduct his or her engineering activities ethically, with the principles by professional ethics and responsibilities of the engineering practice. 2. Understand the nature of professional responsibility and be able to identify the ethical elements in decisions. 3. Be able to address and resolve problems arising from questionable practice. 4. Develop critical thinking skills and professional judgement and understand practical difficulties of bringing about change. 5. Develop a professional ethical identity to carry forward in their working life.
Indicative Contents المحتويات الإرشادية	The module will teach the following: Introduction to ethical theories, ethical dilemmas, ethical positions. Personal ethics. Professional ethics. Principles of Engineering ethical and case studies. Awareness of professional ethics issues, obligations, and responsibilities. Resolving practical problems through identifying ethical issues, examining opposing positions and making ethical decisions. The following of Sequence of engineering tasks • Preliminary preparation idea - market requirements the design • Mental visualization - Initial design - Performance specifications - Preliminary analysis • Detailed analysis Digital representations or laboratory models Material and parts specifications Detailed manufacturing drawings manufacturing • Scheduling tasks - procurement of parts and materials • Parts manufacturing - assembly or construction • Quality control – testing implementation • Advertising - Marketing and Finance - The Brief Guide to Parts and Operation • Transportation - Installation - Training of technicians - Establishing safety procedures and devices • Use of the product • Field service - maintenance - spare parts • Monitoring - Evaluation of impact on the environment - Communication of potential risks • Instantaneous

	• End tasks • Restoration, renovation and re-manufacturing service • Disposal of consumables and waste Classical Moral Theory as Applied to Science and Engineering, Evaluating Ethical Judgments, Persuasive Communications, Ethics in the Global Engineering Profession.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Engineering ethics is to sensitize the students to important ethical issues before you have to confront. You will study important cases from the past so that you will know what situations other engineers have faced and will know what to do when similar situations arise in their professional career. Finally, you will learn techniques for analyzing and resolving ethical problems when you arise

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to ethical theories,
Week 2	Ethical dilemmas,
Week 3	Ethical positions
Week 4	Personal ethics.
Week 5	Professional ethics.
Week 6	Principles of Engineering ethical and case studies.
Week 7	Mid-term Exam
Week 8	Awareness of professional ethics issues, obligations, and responsibilities
Week 9	Awareness of professional ethics issues, obligations, and responsibilities
Week 10	Awareness of professional ethics issues, obligations, and responsibilities
Week 11	Resolving practical problems through identifying ethical issues
Week 12	Resolving practical problems through identifying ethical issues
Week 13	Examining opposing positions

Week 14	Making ethical decisions.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	An introduction to the ethics of the engineering profession, The authors are Ronald Schenzinger, Mike Martin Translated by Dr. Yahya Khalif Obeikan Publishing, 2012 ISBN 9960549453, 9789960549453 The number of pages is 293 pages	Yes
Recommended Texts		
Websites		

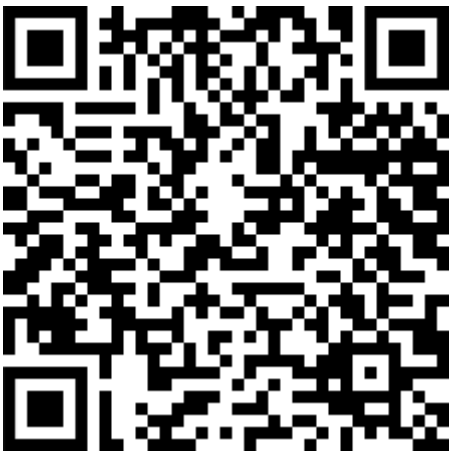
APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**

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

Note:

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



قسم الهندسة الميكانيكية – طاقة

متطلبات مسار بولونيا

جامعة ذي قار	University of Thi-Qar
مستوى البكالوريوس (الدورة الأولى) - بكالوريوس مع مرتبة الشرف في الهندسة الميكانيكية / طاقة	Bachelor's level (First cycle) - Honors Bachelor degree in Mechanical / Energy
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة اوربية - كل وحدة اوربية = ٢٥ ساعة	Four years (Eight semesters) - 240 ECTS credits - 1 ECTS = 25hr
المنهاج الدراسي للعام ٢٠٢٣-٢٠٢٤	Program Curriculum (2023 - 2024)

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
	B	7.00	175	52	123	3		2			2	4	English	التفاضل والتكامل	Calculus	ER 101	1		
	S	2.00	50	17	33	3					1	1	Arabic	مهارات اللغة العربية	Arabic language skills	UR 101	2		
	C	7.00	175	81	94	4				2	1	3	English	مبادئ عمليات الإنتاج	Principle of production processes	ME101	3		
	C	4.00	100	36	64	4				2		2	English	اساسيات علم الحاسوب	Principles of computer science	ER 102	4	One	
	B	4.00	100	67	33	3						2	English	فيزياء	Physics	ER 103	5		
	B	6.00	150	72	78	3		1			1	3	English	ميكانيك هندسي (الستاتك)	Engineering Mechanics (Static)	Me 102	6		
		30.00	750	325	425	20	0	3	0	4	5	15	Total						

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
	C	5.00	125	62	63	3		1				3	English	ميكانيك الهندسي (الداينمك)	Engineering mechanics (Dynamics)	Me 103	1		UGI
	B	7.00	175	67	108	3				4	1	2	English	الرسم الهندسي	Engineering drawing	ER 104	2		
	C	6.00	150	86	64	4				2		2	English	مبادئ الهندسة الكهربائية	Princples of Electrical Engineering	ME104	3		
	S	2.00	50	17	33	3					1	1	English	اساسيات اللغة الإنكليزية	Basics of english language	UR 102	4	Two	
	B	4.00	100	67	33	3						2	English	كيمياء	Chemistry	ER 105	5		
	C	6.00	150	86	64	4				2		2	English	خواص المواد	Properties of Materials	ME105	6		
		30.00	750	385	365	20	0	1	0	8	2	12	Total						

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
ER 101	B	7.00	175	52	123	3		2			2	4	English	الرياضيات التطبيقية	Applied Mathematics	ER 201	1		
	C	6.00	150	71	79	4		1		2		2	English	مقاومة المواد	Strength of materials	ME201	2		
	C	6.00	150	71	79	4		1		2		2	English	ديناميك الحرارة	Thermodynamics	ME202	3		
	C	5.00	125	61	64	4				2		2	English	الموائع الساكنة	Static Fluid	ME203	4	Three	
	S	2.00	50	17	33	3					1	1	English	حقوق الانسان والديمقراطية	Human right and democracy	UR 201	5		
ER 102	B	4.00	100	36	64	4				2		2	English	برمجة الحاسوب	Computer programming	ER 202	6		
		30.00	750	308	442	22	0	4	0	8	3	13	Total						

Prerequisite Module(s) Code	Module Type	ECTS	SWL	USSWL	SSWL	Exam	SSWL (hr/w)						Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
			hr/sem	hr/sem	hr/sem	hr/sem	Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)							
ME201	C	6.00	150	71	79	4		1		2		2	English	تحليل الاجهادات	Stresses analysis	ME204	1		UGII
ME202	C	6.00	150	71	79	4		1		2		2	English	تطبيقات ديناميك الحرارة	Thermodynamics applications	ME205	2		
	C	7.00	175	82	93	3				3		3	English	الرسم الميكانيكي	Mechanical Drawing	ME206	3		
ME203	C	6.00	150	71	79	4		1		2		2	English	الموائع المتحركة وتطبيقاتها	Fluid Dynamics with applications	ME207	4	Four	
	C	5.00	125	61	64	4				2		2	English	هندسة المعادن	Engineering of Metallurgy	ME208	5		
																	6		
		30.00	750	356	394	19	0	3	0	11	0	11	Total						

Prerequisite Module(s) Code	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	8.00	200	77	123	3		2			2	4	English	التحليلات الهندسية والعددية	Engineering and numerical Analyses	ME301	1		
	C	4.00	100	36	64	4				2		2	English	انتقال الحرارة بالتوصيل	Conduction Heat Transfer	ME302	2		
ME104	C	5.00	125	46	79	4				2		3	English	المكائن الكهربائية	Electrical Machinery	ME303	3		
	C	5.00	125	61	64	4				2		2	English	مكائن الاحتراق الداخلي	Internal Combustion Engines	ME304	4	Five	
	C	4.00	100	36	64	4				2		2	English	ديناميك الغازات	Gas dynamics	ME305	5		
		4.00	100	36	64	4				2		2	English	اساسيات الطاقة المتجدده	Principles of Renewable energy	MEE301	6		
		30.00	750	292	458	23	0	2	0	10	2	15	Total						

Prerequisite Module(s) Code	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
ME302	C	4.00	100	36	64	4				2		2	English	انتقال الحرارة بالحث	Convection Heat Transfer	ME306	1		UGIII
	C	7.00	175	81	94	4				2	2	2	English	طاقة الرياح	Wind energy	MEE302	2		
	C	5.00	125	61	64	4				2		2	English	التوربينات	Turbo machinery	ME307	3		
	C	7.00	175	81	94	4				2	2	2	English	الطاقة الشمسية	Solar energy	MEE303	4	Six	
	C	5.00	125	61	64	4				2		2	English	الطاقة المتجددة	Renewable energy	MEE304	5		
	S	2.00	50	17	33	3					1	1	English	مهارات اللغة الإنكليزية	English language skills	UR 301	6		
		30.00	750	337	413	23	0	0	0	10	5	11	Total	التدريب الصيفي	Summer training	MEE305			

Prerequisite Module(s) Code	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	4.00	100	52	48	3		1				2	English	حفظ الطاقة	Energy conservation	MEE401	1		
	C	5.00	125	61	64	4				2		2	English	التكييف	Air Conditioning	ME402	2		
MEE303	C	5.00	125	61	64	4				2		2	English	تطبيقات الطاقة الشمسية	Applications of solar energy	MEE402	3		
	C	5.00	125	61	64	4				2		2	English	محطات قدرة بخارية	Steam power plants	MEE404	4	Seven	
	C	5.00	125	61	64	4				2		2	English	السيطرة والقياسات	Control and Measurements	ME405	5		
	C	6.00	150	102	48	3			2			1	English	المشروع الهندسي	Engineering project	MEE403	6		
		30.0	750	398	352	22	0	1	2	8	0	11	Total						

Prerequisite Module(s) Code	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	7.00	175	67	108	3		1	2	2		2	English	تصميم أنظمة الطاقة	Design of energy systems	MEE404	1		UGIV
ME402	C	5.00	125	61	64	4				2		2	English	التثليج	Refrigeration	ME408	2		
	C	5.00	125	62	63	3					2	2	English	الإدارة الهندسية وإدارة الطاقة	Engineering and Energy Management	MEE405	3		
MEE404	C	5.00	125	61	64	4				2		2	English	محطات قدرة غازية	Gas power plants	MEE406	4	Eight	
MEE403	C	6.00	150	102	48	3			2			1	English	المشروع الهندسي	Engineering project	MEE407	5		
	S	2.00	50	17	33	3					1	1	English	اخلاقيات المهنة	Ethics	ER 401	6		
		30.0	750	370	380	20	0	1	4	6	3	10	Total						
Must be 240 ECTS		240.0	6000	2771	3229	169	0	15	6	65	20	98	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	**Lect**	
					Seminar	**Semn**	

UNIVERSITY of Thi-Qar
جامعة ذي قار

Bachelor of Science Honours (B.Sc. Honours) – Mechanical Engineering / Energy

بكالوريوس هندسة ميكانيكية / الطاقة

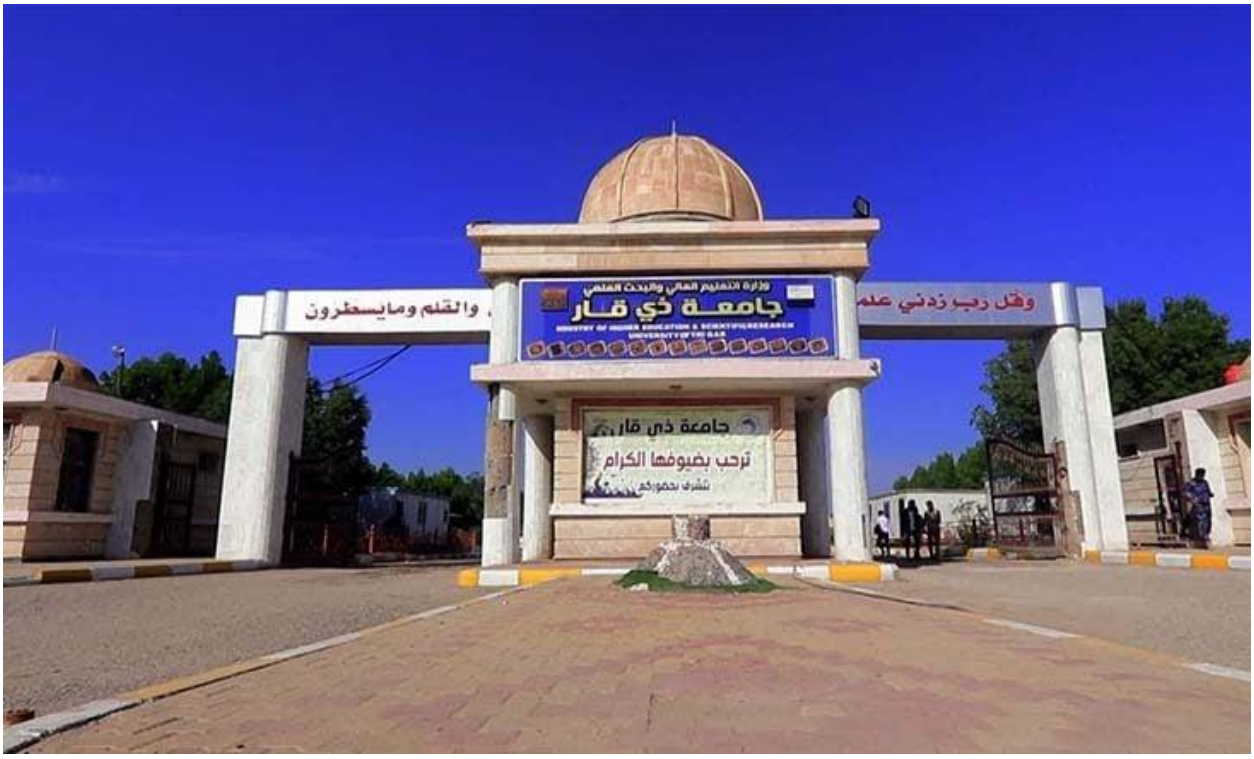


Table of Contents | جدول المحتويات

1. Mission & Vision Statement

Vision Statement

Vision Statement:

The Energy Branch of the Mechanical Engineering Department at the University of Thi-Qar envisions a future where sustainable and efficient energy solutions power the world. We strive to be a leading force in innovative research, education, and collaboration, driving advancements in renewable energy, clean technologies, and energy efficiency. Our vision is to create a sustainable energy ecosystem that fosters economic growth, environmental stewardship, and improved quality of life for local and global communities. Through cutting-edge research, interdisciplinary collaborations, and a commitment to excellence, we aim to empower the next generation of engineers, equipping them with the knowledge and skills to address the world's energy challenges. Together, we envision a brighter, cleaner, and more sustainable future, where energy is harnessed responsibly to power a thriving society.

Mission Statement

Mission Statement:

The Energy Branch of the Mechanical Engineering Department at the University of Thi-Qar is dedicated to advancing energy-related knowledge, technologies, and solutions to address the global energy challenges of today and tomorrow. Our mission is threefold:

1. Education: We strive to provide a comprehensive and interdisciplinary education to our students, equipping them with the necessary skills, expertise, and ethical mindset to contribute effectively to the field of energy engineering. Through rigorous academic programs, hands-on training, and practical experiences, we aim to nurture talented individuals who can excel in diverse energy-related industries.

2. Research and Innovation: We are committed to conducting cutting-edge research in energy systems, renewable energy technologies, energy efficiency, and sustainable solutions. By promoting a culture of innovation and collaboration, we aim to develop novel approaches, technologies, and methodologies that address critical energy challenges and drive positive change in the energy sector.

3. Community Engagement: We actively engage with local and global communities to raise awareness about the importance of sustainable energy practices. Through outreach programs, partnerships with industry, and knowledge sharing initiatives, we seek to empower individuals and organizations to make informed decisions regarding energy consumption, conservation, and the adoption of clean energy alternatives.

Through our unwavering dedication to education, research, and community engagement, we aspire to make a meaningful and lasting impact on the energy landscape. By nurturing future

leaders, advancing scientific knowledge, and inspiring sustainable practices, we aim to contribute to a prosperous and sustainable future for our society and the planet."

2. Program Specification

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

The Energy Branch in Mechanical Engineering at Thi-Qar University offers a dynamic and comprehensive program that reflects the diverse and ever-evolving nature of mechanical engineering. With a team of dedicated faculty members and cutting-edge facilities, we are committed to delivering a high-quality education in this field.

Our program places a strong emphasis on fostering a deep understanding of mechanical systems and their interconnectedness. From the fundamental components like gears and mechanisms to the larger-scale systems such as engines and robotics, we delve into the entirety of mechanical engineering. We believe in taking a holistic approach that considers the complete system and its integration with other disciplines, recognizing that real-world challenges require multidimensional solutions.

What sets our program apart is its broad scope, catering to students with varying interests and ambitions. Some students are attracted to the breadth of energy engineering, appreciating the opportunity to acquire knowledge and skills in diverse areas. This breadth allows them to develop a well-rounded foundation and a versatile skill set that can be applied across industries. For others, our program serves as a stepping stone towards specialization. By offering specialized degrees in areas like power plant engineering, energy systems, or Renewable energy, we provide students with the opportunity to focus on their specific interests and career aspirations.

At the end of the third year, all students have the flexibility to choose their desired specialization, including the option to join our esteemed Energy Branch. This specialization equips students with a deep understanding of energy engineering principles, renewable energy technologies, energy efficiency, and sustainable solutions. Our aim is to empower students to contribute to the rapidly evolving energy sector and address the pressing global energy challenges of today and the future.

By providing a comprehensive education, fostering interdisciplinary collaboration, and staying abreast of emerging industry trends, we strive to prepare our students to become accomplished professionals who can make a significant impact in the field of mechanical engineering, particularly in the realm of energy systems.

The Energy Branch of Mechanical Engineering at Thi-Qar University offers a comprehensive program that builds a strong foundation in the fundamental principles of energy mechanical engineering. Our curriculum covers key subjects such as mechanics, thermodynamics, and materials science, which provide students with a solid understanding of the core principles that underpin the field. This knowledge forms the basis for practical application, as students engage in laboratory sessions, design projects, and hands-on experiences that enhance their problem-solving and technical skills.

In addition to mastering the core subjects, we emphasize the importance of interdisciplinary collaborations. We encourage students to explore the connections between energy engineering and other fields, such as environmental science, sustainability, and societal needs. By understanding the broader context, our graduates are equipped to make meaningful contributions to their communities and address pressing global challenges, such as developing sustainable energy solutions and reducing environmental impact.

At Thi-Qar University, we foster a supportive and engaging learning environment. Our dedicated faculty members are committed to providing quality education through interactive

lectures, practical demonstrations, and research opportunities. We strive to create an atmosphere where students can develop critical thinking, problem-solving, and teamwork skills that are essential for success in the field of mechanical engineering.

Our program's ultimate goal is to produce well-rounded graduates who possess a deep understanding of the subject, practical skills, and a passion for innovation. We aim to prepare our students to become future leaders who are capable of driving advancements, improving efficiency, and contributing to the development and progress of society through their knowledge and expertise in mechanical engineering.

The Energy Branch of Mechanical Engineering at Thi-Qar University follows a structured program that aims to progressively develop students' knowledge and skills in the field. The program is designed to provide a comprehensive understanding of mechanical engineering while allowing students to specialize within the energy branch.

The program begins at Level 1, where students are introduced to the fundamentals of mechanical engineering, establishing a solid foundation for their future studies. As they progress to Level 2, students delve deeper into program-specific core topics that prepare them for more specialized subject specialist modules at Levels 3 and 4. This progression ensures that graduates of the program possess a well-rounded knowledge base and appreciate the significant role that research plays in informing teaching practices, aligning with the University and College's mission statements.

The program fosters a research-oriented mindset from the beginning by integrating practicals within lecture modules and providing dedicated practical modules. Research seminars and tutorials further reinforce the importance of research in the field. At Level 1, students participate in a compulsory field course that offers hands-on experience and knowledge essential for their progression to Level 2. Additional field courses are available at subsequent levels, allowing students to explore specific areas of interest. From Level 3 onwards, all students in the Mechanical Engineering program at Thi-Qar University have the opportunity to specialize in the Energy Branch. This specialization allows students to delve deeper into energy-related subjects, gaining a comprehensive understanding of renewable energy technologies, energy conversion systems, energy efficiency, and sustainable practices.

By choosing the Energy Branch, students can explore specialized courses tailored to the energy sector, including advanced energy systems analysis, power generation and distribution, energy economics, and sustainable energy planning and design. These courses equip students with the knowledge and skills needed to tackle the unique challenges and opportunities in the field of energy engineering.

Through the Energy Branch, students have access to hands-on experiences, research projects, and industry collaborations specific to energy-related topics. This enables them to apply their knowledge in practical settings and gain a deeper understanding of the real-world applications of sustainable energy solutions.

The Energy Branch provides a pathway for students to contribute meaningfully to the global energy transition, addressing the pressing need for clean and efficient energy sources. It

prepares them to tackle complex energy-related issues, develop innovative solutions, and contribute to the development of a sustainable future.

Overall, the Energy Branch within the Mechanical Engineering program at Thi-Qar University offers students the chance to specialize in energy engineering, providing them with the necessary expertise and skills to be at the forefront of addressing the world's energy challenges.. At Level 4, all students undertake an independent research project, which can be tailored to their preferences and the available resources, including library or data analysis projects, or field and laboratory-based projects.

To provide continuous guidance and support, academic tutorials are conducted at Levels 1 and 2 with the same tutor who also serves as the students' personal tutor for consistency. These tutorials incorporate workshops that teach essential skills like library research and presentation techniques. Students have opportunities to apply and refine these skills within the context of their subject through assessed exercises such as essays and presentations.

Thi-Qar University also offers international years and industrial placements, allowing students to gain valuable experiences and exposure to different cultures and industry practices. Individual needs and preferences are considered, and discussions with the appropriate tutor ensure that students can take full advantage of these opportunities whenever feasible.

Overall, the Mechanical Engineering program at Thi-Qar University combines a structured curriculum, research-oriented practical experiences, and personalized guidance to equip students for successful careers in mechanical engineering. By fostering a strong research

ethos, offering diverse module choices, and providing opportunities for international and industrial experiences, we strive to develop well-rounded graduates who are prepared to excel in the field and contribute to the advancement of mechanical engineering.

3. Program Goals

1. Graduation of qualified engineers in the specialization of mechanical engineering with the ability to distinguish, analyze, find appropriate solutions to the problems of application and deal with modern technologies with great skill.
2. The department aims to provide the country with mechanical engineers who contribute to the development of energy sectors, industrial sectors, projects management and solving the engineering problems associated with the development of industrial and technical fields.
3. Develop scientific research field and scientific and engineering expertise.
4. Developing the community through the training and rehabilitation of engineers and employees of the departments of the province through the establishment of training courses.
5. Contribute to the dissemination of scientific and engineering knowledge in the community with the establishment of seminars and scientific conferences that address the topics that concern the development of society.
6. Preparing qualified graduates to enroll in graduate programs within and outside the country and work in research centers.

4. Student Learning Outcomes

The program has graduate outcomes that prepare graduates to attain the program educational objectives few years after graduation. The graduate outcomes stated in this report were set according to the Iraqi Engineering Graduate's Attributes in terms of

knowledge, skills, abilities and attitudes. Societal and environmental aspects have been also considered under the title of ethics. Students must be directed towards enhancing the quality of human life and maintaining sustainability principles, cultural heritage and humanitarian and patriotism values.

Outcome 1

An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.

Outcome 2

An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process.

Outcome 3

An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.

Outcome 4

An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels.

Outcome 5

An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations.

Outcome 6

An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly.

Outcome 7

An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty.

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6. Credits, Grading and GPA

Credits

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

Note:

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

Calculation of the Grade Point Average (GPA)

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

   GPA of a 4-year B.Sc. degrees:

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

7. Curriculum/Modules

Semester 1 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ER 101	Calculus	123	52	7.00	B	
UR 101	Arabic language skills	33	17	2.00	S	
ME101	Principle of production processes	94	81	7.00	C	
ER 102	Principles of computer science	64	36	4.00	B	
ER 103	Physics	33	67	4.00	B	
Me 102	Engineering Mechanics (Static)	78	72	6.00	B	

Semester 2 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Me 103	Engineering mechanics (Dynamics)	63	62	5.00	C	
ER 104	Engineering drawing	108	67	7.00	B	
ME104	Principles of Electrical Engineering	64	86	6.00	C	

UR 102	Basics of english language	33	17	2.00	S	
ER 105	Chemistry	33	67	4.00	B	
ME105	Properties of Materials	64	86	6.00	C	

Semester 3 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ER 201	Applied Mathematics	123	52	7.00	B	ER 101
ME201	Strength of materials	79	71	6.00	C	
ME202	Thermodynamics	79	71	6.00	C	
ME203	Static Fluid	64	61	5.00	C	
UR 201	Human right and democracy	33	17	2.00	S	
ER 202	Computer programming	64	36	4.00	B	ER 102

Semester 4 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME204	Stresses analysis	79	71	6.00	C	ME201
ME205	Thermodynamics applications	79	71	6.00	C	ME202
ME206	Mechanical Drawing	93	82	7.00	C	
ME207	Fluid Dynamics with applications	79	71	6.00	C	ME203
ME208	Engineering of Metallurgy	64	61	5.00	C	
						ME201

Semester 5 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME301	Engineering and numerical Analyses	123	77	8.00	C	
ME302	Conduction Heat Transfer	64	36	4.00	C	
ME303	Electrical Machinery	79	46	5.00	C	ME104
ME304	Internal Combustion Engines	64	61	5.00	C	
ME305	Gas dynamics	64	36	4.00	C	

MEE301	Principles of Renewable energy	64	36	4.00	C	

Semester 6 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME306	Convection Heat Transfer	64	36	4.00	C	ME302
MEE302	Wind energy	94	81	7.00	C	
ME307	Turbo machinery	64	61	5.00	C	
MEE303	Solar energy	94	81	7.00	C	
MEE304	Renewable energy	64	61	5.00	C	
UR 301	English language skills	33	17	2.00	S	ME302

Semester 7 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MEE401	Energy conservation	48	52	4.00	C	
ME402	Air Conditioning	64	61	5.00	C	
MEE402	Applications of solar energy	64	61	5.00	C	MEE303

MEE404	Steam power plants	64	61	5.00	C	
ME405	Control and Measurements	64	61	5.00	C	
MEE403	Engineering project	48	102	6.00	C	

Semester 8 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MEE404	Design of energy systems	108	67	7.00	C	
ME408	Refrigeration	64	61	5.00	C	ME402
MEE405	Engineering and Energy Management	63	62	5.00	C	
MEE406	Gas power plants	64	61	5.00	C	MEE404
MEE407	Engineering project	48	102	6.00	C	MEE403
ER 401	Ethics	33	17	2.00	S	

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UNIVERSITY of Thi-Qar

جامعة ذي قار

Bachelor of Science Honours (B.Sc. Honours) - Mechanical Engineering/Energy

بكالوريوس علوم – هندسة ميكانيكية-طاقة

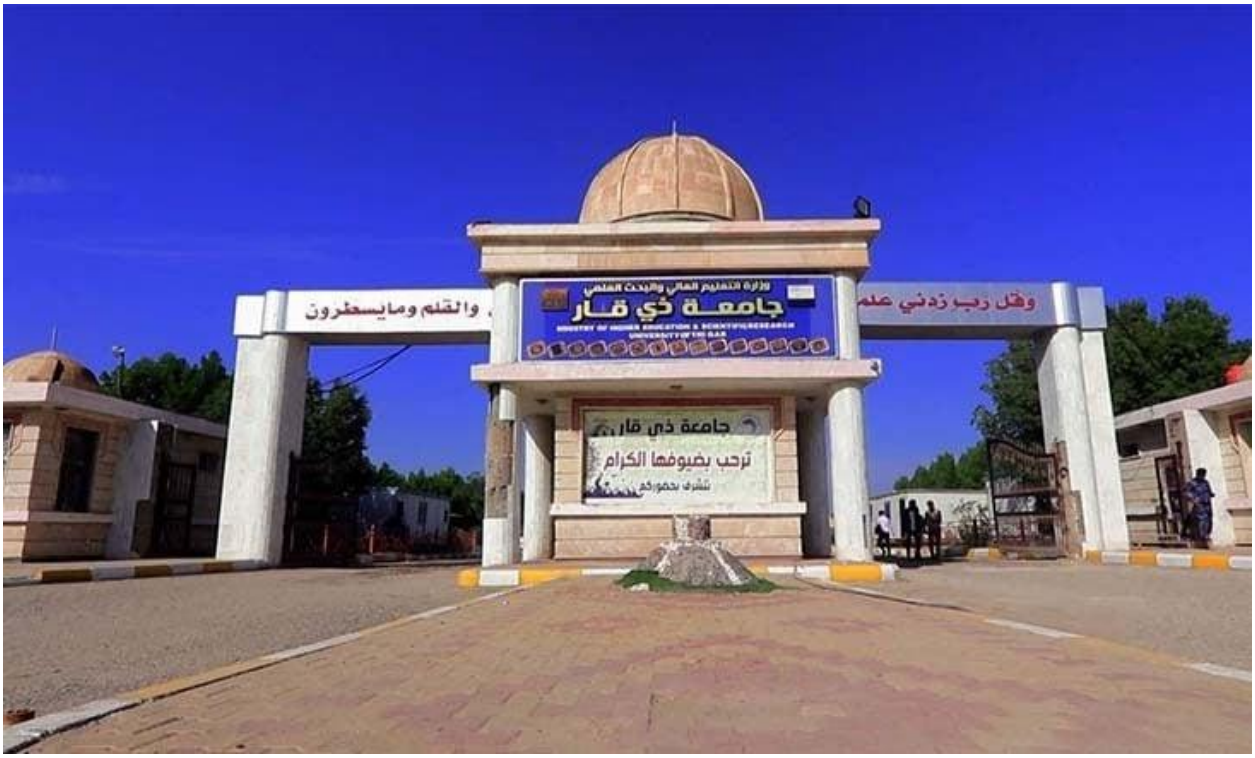


Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of Electrical Engineering to gain the Bachelor of Science degree. The program delivers (48) Modules with 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) مادة دراسية مع ٢٤إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

1

Code	Course/Module Title	ECTS	Semester
ER 101	Calculus	7.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	52	123
Description			
The Calculus for Mechanical Engineering module provides students with a solid foundation in calculus and its practical applications within mechanical engineering. This module covers			

fundamental concepts such as limits, rates of change, and optimization through differentiation. Integration techniques for areas, volumes, and centroids are explored. Additionally, students learn how to model and analyze dynamic systems using ordinary differential equations. Through practical exercises and real-world case studies, students develop critical thinking skills and the ability to apply calculus principles in solving engineering problems. This module prepares students to tackle advanced topics in mechanical engineering, enabling them to excel in dynamics, thermodynamics, fluid mechanics, and control systems.

2

Code	Course/Module Title	ECTS	Semester
UR 101	Arabic language skills	2.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33
Description			
The Arabic Language Skills for Mechanical Engineering module enhances the language proficiency of mechanical engineering students in Arabic. This module focuses on developing reading, writing, listening, and speaking skills tailored to the field. Students learn technical vocabulary, grammar, and terminology relevant to mechanical engineering. They practice reading and comprehending technical documents, research papers, and engineering manuals in Arabic. Writing skills are honed through composing reports, summaries, and technical descriptions. Listening comprehension is enhanced through audiovisual materials and lectures in Arabic. Speaking skills are developed through discussions, presentations, and role-plays. By the module's end, students will have improved their Arabic language proficiency, enabling effective communication in engineering contexts and access to Arabic resources, research, and professional networks, fostering global engineering perspectives.			

3

Code	Course/Module Title	ECTS	Semester
ME101	Principle of production processes	7.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	81	94
Description			
The Principles of Production Processes module equips mechanical engineering students with a deep understanding of the foundational principles governing various production processes. This module delves into the methodologies, technologies, and strategies employed in manufacturing and production within the mechanical engineering field.Students will explore essential concepts such as production planning, process optimization, quality control, and resource management. They will gain insights into diverse manufacturing techniques, including machining, casting, welding, and additive manufacturing, examining their applications, strengths, and limitations.Through practical exercises and case studies, students will develop skills in process design, analysis, and enhancement. They will also acquire knowledge of production systems encompassing automation, robotics, and computer-integrated manufacturing.			

4

Code	Course/Module Title	ECTS	Semester
ER 102	Principles of computer science	4.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
The Principles of Computer Science module introduces mechanical engineering students to the foundational principles and concepts of computer science. This module explores the application of computer science in solving engineering problems, enhancing efficiency, and enabling innovation within the mechanical engineering field.Students will learn essential programming concepts, algorithms, and data structures. They will develop skills in programming languages commonly used in mechanical engineering, such as MATLAB and Python. The module covers topics including control structures, functions, arrays, and object-oriented programming.Through practical exercises and projects, students will gain hands-on experience in applying computer science principles to solve mechanical engineering challenges. They will learn to analyze data, perform simulations, and develop computational models.By the end of the Principles of Computer Science module, students will have a solid understanding of computer science fundamentals and their relevance in mechanical engineering. They will possess the skills to design and implement computational solutions, leveraging programming and data analysis techniques. This knowledge will empower them to tackle complex engineering problems, optimize processes, and contribute to cutting-edge advancements in the field.			

5

Code	Course/Module Title	ECTS	Semester
ER 103	Physics	4.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	67	33

Description

The Physics for Mechanical Engineering module provides students with a comprehensive understanding of the fundamental principles of physics and their applications in mechanical engineering. This module covers key topics including mechanics, thermodynamics, fluids, and electromagnetism.Students will delve into the principles of classical mechanics, studying concepts such as motion, forces, energy, and momentum. They will explore thermodynamics and gain knowledge of the laws governing energy transfer, heat, and work in mechanical systems. The module will also cover fluid mechanics, including fluid dynamics and the behavior of gases and liquids.Additionally, students will study electromagnetism, learning about electric and magnetic fields, circuits, and electromagnetic waves. They will develop a strong foundation in the principles of physics through theoretical analysis and practical experiments.By the end of the Physics for Mechanical Engineering module, students will have a deep understanding of the laws and principles governing the behavior of mechanical systems. They will be able to apply their knowledge to analyze and design mechanical components and systems, and make informed decisions regarding material selection, energy efficiency, and system optimization. This module prepares students for advanced topics in mechanical engineering, such as dynamics, vibrations, control systems, and renewable energy technologies.

6

Code	Course/Module Title	ECTS	Semester
Me 102	Engineering Mechanics (Static)	6.00	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	72	78
Description			
The Engineering Mechanics (Static) module provides mechanical engineering students with a solid understanding of the principles of statics. This module focuses on the analysis and design of mechanical systems at rest or in equilibrium. Students learn the concepts of forces, moments, and structural stability.Through the module, students study vector algebra, free-body diagrams, and equilibrium conditions to analyze and solve engineering problems involving trusses, frames, beams, and machines. They develop skills in determining support reactions, calculating internal forces, and assessing the stability of mechanical components.By completing the Engineering Mechanics (Static) module, students gain the necessary foundation to analyze and design mechanical systems that maintain equilibrium, setting the stage for advanced topics in structural analysis and machine design within mechanical engineering.			

7

Code	Course/Module Title	ECTS	Semester
Me 103	Engineering mechanics (Dynamics)	5.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

3	1	62	63

Description

The Engineering Mechanics (Dynamics) module provides mechanical engineering students with a comprehensive understanding of the principles of dynamics. This module focuses on the analysis and design of mechanical systems in motion. Students learn about the kinematics and kinetics of particles and rigid bodies.Through the module, students study concepts such as velocity, acceleration, Newton's laws of motion, and energy methods to analyze the motion of mechanical systems. They explore topics including impulse and momentum, work and energy, and vibrations.By completing the Engineering Mechanics (Dynamics) module, students gain the necessary foundation to analyze and design mechanical systems in dynamic motion. This prepares them for advanced topics in robotics, vehicle dynamics, machinery design, and other areas within mechanical engineering.

8

Code	Course/Module Title	ECTS	Semester
ER 104	Engineering drawing	7.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	5	67	108

Description

The Engineering Drawing module is designed to equip mechanical engineering students with the fundamental skills necessary to create and interpret technical drawings. This module focuses on the principles, techniques, and standards involved in generating accurate and detailed engineering drawings.Students will learn the fundamentals of orthographic projection, isometric projection, and sectioning to represent three-dimensional objects on two-dimensional paper. They will study various drawing conventions, including dimensioning, tolerancing, and symbols used in mechanical engineering.Through practical exercises and hands-on projects, students will develop proficiency in creating engineering drawings for components, assemblies, and machine parts. They will learn to communicate design specifications, manufacturing instructions, and tolerances effectively.By the end of the Engineering Drawing module, students will possess the necessary skills to read and create engineering drawings, which are essential for mechanical engineering design, manufacturing, and documentation. They will be able to accurately communicate their design ideas, collaborate with other engineers, and understand technical drawings in various mechanical engineering applications.

9

Code	Course/Module Title	ECTS	Semester
ME104	Principles of Electrical Engineering	6.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	86	64
Description			
The Principles of Electrical Engineering module provides mechanical engineering students with a foundational understanding of electrical principles and their applications within the field. This module focuses on essential concepts such as circuit analysis, electrical components, and electromechanical systems.Students will study fundamental electrical laws, including Ohm's law and Kirchhoff's laws, and learn how to analyze and design basic electrical circuits. They will gain knowledge of electrical components such as resistors, capacitors, and inductors, and explore their behavior in circuits.Through practical exercises and laboratory work, students will gain hands-on experience with electrical measurements, circuit simulations, and the operation of electromechanical devices. They will learn to apply electrical principles to solve problems related to motor control, sensors, and power distribution.By the end of the Principles of Electrical Engineering module, students will have a solid understanding of electrical principles and their application to mechanical systems. They will be equipped to integrate electrical components and systems into mechanical designs, contributing to the development of advanced technologies and the efficient operation of mechanical engineering systems.			

10

Code	Course/Module Title	ECTS	Semester
UR 102	Basics of english language	2.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33

Description

The Basics of English Language module is designed to provide mechanical engineering students with the foundational skills necessary to communicate effectively in English. This module focuses on developing essential language skills, including reading, writing, listening, and speaking, tailored specifically to the context of mechanical engineering.Students will learn basic grammar, vocabulary, and sentence structure to enhance their reading and writing abilities. They will practice listening comprehension through engineering-related audio materials, lectures, and presentations. Speaking skills will be honed through discussions, presentations, and role-plays, focusing on engineering topics.By the end of the Basics of English Language module, students will have improved their English language proficiency, enabling them to communicate confidently and fluently in professional settings within the mechanical engineering industry. They will be better equipped to collaborate with international colleagues, access English-language resources, and present their ideas effectively, enhancing their career prospects and facilitating their participation in a global engineering community.

Code	Course/Module Title	ECTS	Semester
ER 105	Chemistry	4.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	67	33

Description

The Chemistry module for Mechanical Engineering provides students with a foundational understanding of the principles and applications of chemistry within the field. This module focuses on essential concepts such as atomic structure, chemical bonding, thermodynamics, and materials science.Students will study the properties and behavior of matter, including gases, liquids, and solids, as well as the principles of chemical reactions and equilibrium. They will explore the role of chemistry in corrosion, material selection, and environmental impact.Through practical exercises and laboratory work, students will gain hands-on experience with chemical analysis techniques and material characterization. They will learn to apply chemical principles to solve engineering problems related to materials selection, surface treatments, and environmental sustainability.By the end of the Chemistry module, students will have a solid understanding of the chemical principles relevant to mechanical engineering. They will be equipped to make informed decisions regarding material choices, process optimization, and environmental considerations, contributing to the development of sustainable and innovative mechanical engineering solutions.

12

Code	Course/Module Title	ECTS	Semester
ME105	Properties of Materials	6.00	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	86	64
Description			
The Properties of Materials module provides mechanical engineering students with a comprehensive understanding of the properties and behavior of materials commonly used in the field. This module focuses on the relationship between material composition, structure, processing, and performance.Students will study the mechanical, thermal, electrical, and chemical properties of metals, polymers, ceramics, and composites. They will learn about material characterization techniques, such as microscopy and spectroscopy, to analyze and evaluate material properties.Through practical exercises and laboratory work, students will gain hands-on experience in testing and analyzing the mechanical and physical properties of materials. They will learn to interpret material property data and make informed decisions regarding material selection for specific engineering applications.By the end of the Properties of Materials module, students will have a solid understanding of the relationship between material properties and performance. They will be equipped to select appropriate materials for mechanical design, assess material behavior under different conditions, and optimize material selection to meet engineering requirements. This knowledge will enable them to make informed decisions and contribute effectively to the design and development of innovative mechanical engineering solutions.			

13

Code	Course/Module Title	ECTS	Semester
ER 201	Applied Mathematics	7.00	3

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	4	52	123

Description

The Applied Mathematics module is designed to equip mechanical engineering students with the mathematical tools and techniques necessary to solve engineering problems encountered in the field. This module focuses on the application of mathematical concepts in areas such as mechanics, thermodynamics, fluid dynamics, and control systems.Students will study topics including calculus, linear algebra, differential equations, and numerical methods. They will learn to apply mathematical modeling and analysis techniques to solve engineering problems, optimize designs, and predict system behavior.Through practical exercises and computational simulations, students will gain hands-on experience in applying mathematical principles to real-world mechanical engineering scenarios.By the end of the Applied Mathematics module, students will have developed the proficiency to analyze and solve complex engineering problems using mathematical methods. They will be able to apply mathematical models and techniques to optimize mechanical designs, predict system performance, and make informed engineering.

14

Code	Course/Module Title	ECTS	Semester
ME201	Strength of materials	6.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79
Description			
The Strength of Materials module provides mechanical engineering students with a comprehensive understanding of the behavior and strength of materials under various loads and conditions. This module focuses on analyzing and predicting the mechanical response of materials to external forces and stresses.Students will study topics such as stress and strain analysis, material properties, and failure criteria. They will learn about different types of loading, including axial, bending, and torsional loads, and their effects on material behavior.Through practical exercises and laboratory work, students will gain hands-on experience in testing and analyzing material properties, as well as predicting structural performance.By the end of the Strength of Materials module, students will have a solid understanding of the principles and techniques used to analyze the strength and structural integrity of mechanical components and systems. They will be equipped to make informed design decisions, assess material suitability, and ensure the safety and reliability of mechanical engineering applications.			

15

Code	Course/Module Title	ECTS	Semester
ME202	Thermodynamics	6.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79

Description

The Thermodynamics module provides mechanical engineering students with a comprehensive understanding of the principles and applications of thermodynamics. This module focuses on the study of energy transfer, heat, and work in mechanical systems.Students will explore topics including the laws of thermodynamics, properties of substances, energy analysis, and thermodynamic cycles. They will learn to analyze and calculate properties such as temperature, pressure, and entropy, and understand their impact on system performance.Through practical exercises and simulations, students will gain hands-on experience in analyzing thermodynamic processes and evaluating system efficiency.By the end of the Thermodynamics module, students will have a solid understanding of thermodynamic principles and their application in mechanical engineering. They will be equipped to analyze and optimize energy conversion systems, design heat transfer equipment, and contribute to sustainable and efficient engineering solutions.

16

Code	Course/Module Title	ECTS	Semester
ME203	Static Fluid	5.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
The Static Fluids module provides mechanical engineering students with a comprehensive understanding of the behavior and properties of static fluids. This module focuses on the principles and applications of fluid statics.Students will study topics such as pressure, hydrostatic forces, buoyancy, and fluid equilibrium. They will explore the behavior of fluids at rest, analyzing fluid pressure distribution and its effects on submerged objects and fluid containers.Through practical exercises and laboratory work, students will gain hands-on experience in measuring pressure, calculating forces, and analyzing fluid statics scenarios.By the end of the Static Fluids module, students will have a solid understanding of the principles governing the behavior of static fluids. They will be equipped to analyze and design fluid systems, such as tanks, dams, and hydraulic systems, ensuring structural stability and efficient operation within mechanical engineering applications.			

17

Code	Course/Module Title	ECTS	Semester
UR 201	Human right and democracy	2.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33
Description			
The Human Rights and Democracy module introduces mechanical engineering students to the fundamental concepts and principles of human rights and democracy. This module focuses on raising awareness and fostering a sense of responsibility in future engineers towards social justice, inclusivity, and ethical practices.Students will study topics such as universal human rights, democratic principles, social equality, and ethical decision-making. They will explore the intersection between engineering and human rights, considering the impact of engineering projects on individuals, communities, and the environment.Through case studies and discussions, students will examine real-world engineering challenges, addressing issues related to safety, sustainability, and the rights of workers and communities affected by engineering projects.By the end of the Human Rights and Democracy module, students will have a broader perspective on their role as engineers in society. They will be equipped to approach their work with a deeper understanding of the social and ethical implications, striving to promote human rights, social justice, and democratic values in their professional practice.			

18

Code	Course/Module Title	ECTS	Semester
ER 202	Computer programming	4.00	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
The Computer Programming module introduces mechanical engineering students to the foundations of computer programming and its applications within the field. This module focuses on developing programming skills and problem-solving techniques using a language commonly used in engineering applications.Students will learn programming concepts such as variables, loops, conditionals, functions, and data structures. They will gain proficiency in writing code to solve engineering problems, perform data analysis, and automate repetitive tasks.Through practical exercises and projects, students will apply programming principles to simulate mechanical systems, analyze experimental data, and control devices.By the end of the Computer Programming module, students will possess the skills to develop software solutions for engineering challenges. They will be able to write, debug, and optimize code, enhancing their ability to design innovative mechanical systems, perform simulations, and automate processes within the field of mechanical engineering.			

19

Code	Course/Module Title	ECTS	Semester
ME204	Stresses analysis	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79

Description
This course on stresses analysis in mechanical engineering provides a comprehensive understanding of stress-related phenomena in materials and structures. Students will explore fundamental concepts like stress, strain, and material properties, along with various types of stresses and measurement techniques. The course covers stress concentration, failure criteria, and methods for stress analysis, including analytical and numerical approaches. Practical applications in structural design and load-bearing systems will be discussed. By the end of the course, students will have the necessary knowledge and skills to analyze and predict the behavior of materials under different loading conditions, making them proficient in stress analysis within mechanical engineering.

20

Code	Course/Module Title	ECTS	Semester
ME205	Thermodynamics applications	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79
Description			
This course explores the practical applications of thermodynamics in the field of mechanical engineering. Students will delve into the fundamental principles of thermodynamics, including energy, entropy, and heat transfer. The focus will be on applying these principles to real-world scenarios encountered in mechanical engineering, such as power generation, refrigeration, and heat exchangers. Through a combination of theoretical discussions and problem-solving exercises, students will gain a comprehensive understanding of thermodynamic cycles, thermodynamic properties of substances, and energy conversion processes. By the end of the course, students will be equipped with the knowledge and skills to analyze and optimize thermodynamic systems within mechanical engineering applications.			

21

Code	Course/Module Title	ECTS	Semester
ME206	Mechanical Drawing	7.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	82	93
Description			
This course on mechanical drawing in mechanical engineering focuses on developing essential skills for creating detailed and accurate technical drawings. Students will learn to communicate design ideas effectively through the use of engineering drawings, including orthographic projections, sections, and auxiliary views. The course covers topics such as dimensioning, tolerancing, and geometric dimensioning and tolerancing (GD&T). Students will gain proficiency in using drafting tools and computer-aided design (CAD) software to create 2D and 3D drawings. Emphasis will be placed on understanding industry standards and conventions for mechanical drawings. By the end of the course, students will be equipped with the necessary skills to produce professional-grade mechanical drawings for engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME207	Fluid Dynamics with applications	6.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	71	79

Description

This course on fluid dynamics with applications in mechanical engineering provides a comprehensive understanding of fluid behavior and its practical implications. Students will explore the fundamental principles of fluid mechanics, including fluid properties, conservation laws, and flow characteristics. The course covers topics such as fluid statics, flow measurements, and fluid dynamics analysis techniques. Emphasis will be placed on applying fluid dynamics principles to real-world engineering applications, such as pumps, turbines, and pipe networks. Students will gain hands-on experience through laboratory experiments and computational fluid dynamics (CFD) simulations. By the end of the course, students will have the knowledge and skills to analyze and design fluid systems, making them proficient in fluid dynamics within mechanical engineering.

23

Code	Course/Module Title	ECTS	Semester
ME208	Engineering of Metallurgy	5.00	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on the engineering of metallurgy provides a comprehensive understanding of the properties and behavior of metals in mechanical engineering applications. Students will explore the principles of metallurgy, including crystal structure, phase transformations, and mechanical properties of metals. The course covers topics such as alloy design, heat treatment, and metal processing techniques. Emphasis will be placed on the practical application of metallurgical principles in engineering design, materials selection, and manufacturing processes. Through laboratory experiments and case studies, students will gain hands-on experience in analyzing and optimizing the performance of metallic materials. By the end of the course, students will have the knowledge and skills to engineer and utilize metallurgical principles in mechanical engineering practice.			

24

Code	Course/Module Title	ECTS	Semester
ME301	Engineering and numerical Analyses	8.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	77	123
Description			

This course on engineering and numerical analyses equips students with essential skills for solving complex engineering problems using numerical methods. Students will explore the principles and techniques of numerical analysis, including finite element analysis (FEA), computational fluid dynamics (CFD), and numerical optimization. The course covers topics such as numerical modeling, solution algorithms, and result interpretation. Emphasis will be placed on applying numerical methods to solve engineering challenges in areas like structural analysis, heat transfer, and fluid flow. Through hands-on projects and simulations, students will develop proficiency in utilizing engineering software and analyzing results to make informed design decisions. By the end of the course, students will be well-equipped to employ numerical analyses in various mechanical engineering applications.

25

Code	Course/Module Title	ECTS	Semester
ME302	Conduction Heat Transfer	4.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
This course on conduction heat transfer focuses on understanding the principles and applications of heat conduction in mechanical engineering. Students will explore the fundamental concepts of conduction, including Fourier's law, thermal conductivity, and the heat diffusion equation. The course covers topics such as steady-state and transient conduction, one-dimensional and multi-dimensional heat transfer, and thermal resistance networks. Emphasis will be placed on solving conduction problems using analytical and numerical methods. Students will learn how to analyze heat conduction in various engineering systems, including heat exchangers, electronic devices, and insulation materials. By the end of the course, students will possess the knowledge and skills to analyze and design heat transfer systems involving conduction in mechanical engineering.			

Code	Course/Module Title	ECTS	Semester
ME303	Electrical Machinery	5.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	46	79

Description

This course on electrical machinery explores the principles, design, and applications of electrical machines in mechanical engineering. Students will delve into the fundamentals of electrical machines, including generators, motors, and transformers. The course covers topics such as electromagnetism, machine construction, operating principles, and performance characteristics. Emphasis will be placed on understanding the interaction between electrical and mechanical systems, energy conversion, and control of electrical machines. Students will gain hands-on experience through laboratory experiments and projects, enhancing their knowledge of machine operation, efficiency optimization, and troubleshooting. By the end of the course, students will possess the knowledge and skills to analyze, design, and apply electrical machinery in mechanical engineering applications.

27

Code	Course/Module Title	ECTS	Semester
ME304	Internal Combustion Engines	5.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on the fundamentals of internal combustion engines provides a comprehensive understanding of the principles and operations of these crucial power sources. Students will explore the working principles of both spark ignition (SI) and compression ignition (CI) engines, including the thermodynamics of the air-fuel mixture, combustion processes, and power generation. The course covers topics such as engine cycles, fuel systems, ignition systems, and emissions control. Emphasis will be placed on understanding the performance parameters, efficiency optimization, and technological advancements in internal combustion engines. By the end of the course, students will have a solid foundation in internal combustion engines and be equipped with the knowledge to contribute to their design, analysis, and optimization in mechanical engineering applications.			

28

Code	Course/Module Title	ECTS	Semester
ME305	Gas dynamics	4.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
This course on gas dynamics explores the behavior and characteristics of compressible fluids, focusing on their applications in mechanical engineering. Students will delve into the fundamental principles of gas dynamics, including the equations of motion, conservation laws, and thermodynamic properties of compressible fluids. The course covers topics such as one-dimensional flow, shock waves, nozzle design, and supersonic and hypersonic flows. Emphasis will be placed on understanding the effects of compressibility on fluid flow and its implications for engineering systems. Through theoretical analysis and practical examples, students will gain a deeper understanding of gas dynamics and its significance in mechanical engineering applications.			

29

Code	Course/Module Title	ECTS	Semester
MEE301	Principles of Renewable energy	4.00	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	36	64
Description			
This course on the principles of renewable energy provides a comprehensive understanding of the fundamental concepts and applications of renewable energy sources in mechanical engineering. Students will explore various renewable energy technologies, including solar, wind, hydro, and bioenergy systems. The course covers topics such as energy conversion, system design, performance evaluation, and integration into the power grid. Emphasis will be placed on understanding the environmental benefits, economic feasibility, and policy considerations of renewable energy. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of renewable energy systems design, optimization, and sustainability. By the end of the course, students will possess the knowledge and skills to contribute to the development and implementation of renewable energy solutions in mechanical engineering applications.			

30

Code	Course/Module Title	ECTS	Semester
ME306	Convection Heat Transfer	4.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	2	36	64

Description

This course on convection heat transfer focuses on understanding the principles and applications of heat transfer through fluid flow in mechanical engineering. Students will explore the fundamentals of convection, including boundary layers, forced convection, and natural convection. The course covers topics such as heat transfer coefficients, correlations, and heat exchangers. Emphasis will be placed on analyzing convective heat transfer in various engineering systems, such as cooling of electronic devices, heat exchangers, and HVAC systems. Students will learn how to apply empirical and analytical methods to solve convection heat transfer problems. By the end of the course, students will possess the knowledge and skills to analyze and design heat transfer systems involving convection in mechanical engineering applications.

31

Code	Course/Module Title	ECTS	Semester
MEE302	Wind energy	7.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	81	94
Description			
This course on wind energy focuses on the principles, design, and utilization of wind power in mechanical engineering. Students will explore the fundamentals of wind energy, including wind resource assessment, aerodynamics, and turbine technologies. The course covers topics such as wind turbine components, system design, and power generation. Emphasis will be placed on understanding the performance characteristics, efficiency optimization, and integration of wind energy into the power grid. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of wind energy system design, operation, and maintenance. By the end of the course, students will possess the knowledge and skills to contribute to the development and implementation of wind energy solutions in mechanical engineering applications.			

32

Code	Course/Module Title	ECTS	Semester
ME307	Turbo machinery	5.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on turbomachinery focuses on understanding the principles and applications of various turbomachines in mechanical engineering. Students will explore the fundamentals of turbomachinery, including turbines, compressors, and pumps. The course covers topics such as fluid mechanics, thermodynamics, and performance characteristics of turbomachines. Emphasis will be placed on analyzing the flow behavior, energy conversion, and efficiency optimization in turbomachinery. Students will gain hands-on experience through laboratory experiments and simulations, enhancing their knowledge of machine operation, performance assessment, and troubleshooting. By the end of the course, students will possess the knowledge and skills to analyze, design, and apply turbomachinery in mechanical engineering applications, such as power generation, propulsion systems, and fluid transport.			

33

Code	Course/Module Title	ECTS	Semester
MEE303	Solar energy	7.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	81	94
Description			
This course on solar energy provides a comprehensive understanding of the principles, design, and applications of solar power in mechanical engineering. Students will explore the fundamentals of solar energy, including solar radiation, photovoltaics, and solar thermal systems. The course covers topics such as solar panel design, system integration, and energy storage. Emphasis will be placed on understanding the efficiency optimization, economic feasibility, and environmental benefits of solar energy. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of solar energy system design, operation, and maintenance. By the end of the course, students will possess the knowledge and skills to contribute to the development and implementation of solar energy solutions in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
MEE304	Renewable energy	5.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on renewable energy provides a comprehensive understanding of the principles, technologies, and applications of renewable energy sources in mechanical engineering. Students will explore various renewable energy technologies, including solar, wind, hydro, and bioenergy systems. The course covers topics such as energy conversion, system design, and environmental impact. Emphasis will be placed on understanding the benefits, challenges, and integration of renewable energy into the power grid. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of renewable energy system design, optimization, and sustainability. By the end of the course, students will possess the knowledge and skills to contribute to the development and implementation of renewable energy solutions in mechanical engineering applications.			

35

Code	Course/Module Title	ECTS	Semester
UR 301	English language skills	2.00	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33
Description			
This course on English language skills is designed to enhance communication abilities specifically for mechanical engineering professionals. Students will develop proficiency in technical writing, reading comprehension, oral presentations, and professional correspondence. The course covers topics such as technical vocabulary, grammar and syntax, effective communication strategies, and cross-cultural communication. Emphasis will be placed on acquiring the language skills necessary for writing reports, research papers, and project documentation. Students will also practice delivering technical presentations and participating in discussions related to mechanical engineering. By the end of the course, students will have the linguistic competence required to effectively communicate ideas, collaborate with colleagues, and succeed in their careers in the field of mechanical engineering.			

36

Code	Course/Module Title	ECTS	Semester
MEE305	Summer training		6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
Description			
This summer training course in mechanical engineering offers students the opportunity to gain practical industry experience and apply their theoretical knowledge in real-world scenarios. Participants will engage in hands-on training and work on projects related to various mechanical engineering disciplines. The training covers topics such as manufacturing processes, CAD/CAM, automation, and maintenance. Emphasis will be placed on developing technical skills, problem-solving abilities, and teamwork. Students will have the chance to work closely with professionals in the field, learn about industry standards and practices, and enhance their professional networks. By the end of the training, students will have valuable experience and be better equipped for their future careers in mechanical engineering.			

37

Code	Course/Module Title	ECTS	Semester
MEE401	Energy conservation	4.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	52	48

Description
This course on energy conservation focuses on the principles, strategies, and technologies for minimizing energy consumption in mechanical engineering systems. Students will explore the fundamentals of energy efficiency, energy auditing, and energy management. The course covers topics such as thermodynamics, heat transfer, and system optimization for reduced energy usage. Emphasis will be placed on understanding the importance of energy conservation in mitigating environmental impacts and reducing operational costs. Students will gain hands-on experience through case studies and energy-saving projects, enhancing their knowledge of energy-efficient design, retrofitting, and renewable energy integration. By the end of the course, students will possess the knowledge and skills to promote energy conservation practices and develop sustainable solutions in mechanical engineering applications.

Code	Course/Module Title	ECTS	Semester
ME402	Air Conditioning	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on air conditioning focuses on the principles, design, and applications of heating, ventilation, and air conditioning (HVAC) systems in mechanical engineering. Students will explore the fundamentals of psychrometrics, heat transfer, and fluid flow in HVAC systems. The course covers topics such as cooling load estimation, air distribution, refrigeration cycles, and energy efficiency. Emphasis will be placed on understanding the design considerations, equipment selection, and control strategies for effective air conditioning. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of HVAC system design, operation, and maintenance. By the end of the course, students will possess the knowledge and skills to design and analyze air conditioning systems for various mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
MEE402	Applications of solar energy	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on applications of solar energy explores the various uses and technologies associated with solar power in mechanical engineering. Students will delve into the fundamentals of solar energy, including solar radiation, photovoltaics, and solar thermal systems. The course covers topics such as solar-powered heating and cooling, solar water heating, and solar electricity generation. Emphasis will be placed on understanding the design considerations, system integration, and performance optimization of solar energy applications. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of solar energy system design, operation, and maintenance. By the end of the course, students will possess the knowledge and skills to implement and innovate solar energy solutions in mechanical engineering applications.			

40

Code	Course/Module Title	ECTS	Semester
MEE404	Steam power plants	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on steam power plants provides a comprehensive understanding of the principles, design, and operation of steam-based power generation systems in mechanical engineering. Students will explore the fundamentals of thermodynamics, heat transfer, and power cycles as they relate to steam power plants. The course covers topics such as steam generators, turbines, condensers, and auxiliary systems. Emphasis will be placed on understanding the efficiency optimization, environmental considerations, and safety aspects of steam power plants. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of steam system design, operation, and maintenance. By the end of the course, students will possess the knowledge and skills to contribute to the design and operation of efficient steam power plants in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
ME405	Control and Measurements	5.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on control and measurements focuses on the principles and techniques for controlling and measuring mechanical systems in engineering applications. Students will explore the fundamentals of control theory, including feedback control, system dynamics, and stability analysis. The course covers topics such as sensors and transducers, data acquisition, signal conditioning, and instrumentation. Emphasis will be placed on understanding the design and implementation of control systems and measurement techniques for accurate system monitoring and regulation. Students will gain hands-on experience through laboratory experiments and practical projects, enhancing their knowledge of system behavior, control algorithms, and measurement accuracy. By the end of the course, students will possess the knowledge and skills to design and optimize control and measurement systems in mechanical engineering applications.			

42

Code	Course/Module Title	ECTS	Semester
MEE403	Engineering project	6.00	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	102	48
Description			
This course on engineering project provides students with practical experience in executing real-world projects within the field of mechanical engineering. Students will apply their knowledge and skills to undertake engineering projects from conception to completion. The course covers topics such as project management, feasibility analysis, design, prototyping, testing, and documentation. Emphasis will be placed on teamwork, problem-solving, and effective communication throughout the project lifecycle. Students will gain hands-on experience in project planning, resource allocation, risk management, and project evaluation. By the end of the course, students will have developed the abilities to successfully manage and execute engineering projects, preparing them for their future careers in mechanical engineering.			

43

Code	Course/Module Title	ECTS	Semester
MEE404	Design of energy systems	7.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	5	67	108

Description
This course on the design of energy systems provides a comprehensive understanding of the principles, methodologies, and technologies involved in designing efficient and sustainable energy systems. Students will explore various energy sources, including fossil fuels, renewables, and alternative fuels. The course covers topics such as energy conversion, system integration, and optimization techniques. Emphasis will be placed on understanding the environmental impact, economic feasibility, and energy policy considerations in energy system design. Students will gain hands-on experience through design projects and simulations, enhancing their knowledge of energy system modeling, analysis, and optimization. By the end of the course, students will possess the knowledge and skills to design innovative and environmentally friendly energy systems in mechanical engineering applications.

Code	Course/Module Title	ECTS	Semester
ME408	Refrigeration	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on refrigeration focuses on the principles, design, and applications of refrigeration systems in mechanical engineering. Students will explore the fundamentals of thermodynamics, heat transfer, and fluid mechanics as they relate to refrigeration. The course covers topics such as refrigeration cycles, refrigerants, compressors, heat exchangers, and system components. Emphasis will be placed on understanding the design considerations, energy efficiency, and environmental impact of refrigeration systems. Students will gain hands-on experience through practical projects and laboratory experiments, enhancing their knowledge of refrigeration system operation, troubleshooting, and maintenance. By the end of the course, students will possess the knowledge and skills to design, analyze, and optimize refrigeration systems for various mechanical engineering applications.			

45

Code	Course/Module Title	ECTS	Semester
MEE405	Engineering and Energy Management	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	62	63
Description			
This course on engineering and energy management focuses on the principles, strategies, and practices for efficient utilization and conservation of energy in mechanical engineering systems. Students will explore energy management techniques, energy auditing, and energy efficiency measures. The course covers topics such as energy conservation, renewable energy integration, and sustainable practices in engineering applications. Emphasis will be placed on understanding the economic and environmental benefits of energy management, as well as the role of technology and policy in energy decision-making. Students will gain practical experience through case studies and projects, enhancing their knowledge of energy optimization, energy auditing, and sustainable engineering practices. By the end of the course, students will possess the knowledge and skills to contribute to effective energy management and sustainability in mechanical engineering applications.			

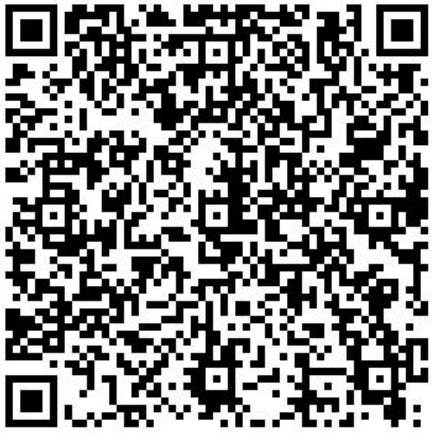
Code	Course/Module Title	ECTS	Semester
MEE406	Gas power plants	5.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	61	64
Description			
This course on gas power plants provides a comprehensive understanding of the principles, design, and operation of gas-based power generation systems in mechanical engineering. Students will explore the fundamentals of thermodynamics, combustion, and power cycles as they relate to gas power plants. The course covers topics such as gas turbines, combined cycle systems, and emissions control. Emphasis will be placed on understanding the efficiency optimization, environmental considerations, and operational challenges of gas power plants. Students will gain hands-on experience through practical projects and simulations, enhancing their knowledge of gas system design, operation, and maintenance. By the end of the course, students will possess the knowledge and skills to contribute to the design and operation of efficient gas power plants in mechanical engineering applications.			

Code	Course/Module Title	ECTS	Semester
MEE407	Engineering project	6.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	102	48

Description

This course on engineering project provides students with practical experience in executing real-world projects within the field of mechanical engineering. Students will apply their knowledge and skills to undertake engineering projects from conception to completion. The course covers topics such as project management, feasibility analysis, design, prototyping, testing, and documentation. Emphasis will be placed on teamwork, problem-solving, and effective communication throughout the project lifecycle. Students will gain hands-on experience in project planning, resource allocation, risk management, and project evaluation. By the end of the course, students will have developed the abilities to successfully manage and execute engineering projects, preparing them for their future careers in mechanical engineering.

Code	Course/Module Title	ECTS	Semester
ER 401	Ethics	2.00	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1	17	33
Description			
This course on ethics explores the ethical considerations and responsibilities in the field of mechanical engineering. Students will examine the ethical principles and values that guide professional conduct and decision-making. The course covers topics such as integrity, accountability, sustainability, and social impact of engineering projects. Emphasis will be placed on understanding the ethical dilemmas and challenges faced by mechanical engineers in their professional practice. Students will engage in case studies and discussions to develop critical thinking and ethical reasoning skills. By the end of the course, students will possess the knowledge and skills to make ethically informed decisions and contribute responsibly to society as mechanical engineering professionals.			



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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	METALLURGY		**Module Delivery**	
Module Type	BASIC		**Theory** **Lecture** **Lab/ Practical** **Tutorial** **Seminar**	
Module Code				
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGII		**Semester of Delivery**	4
Administering Department	ME		**College**	ER
Module Leader	Dr. Kamal S. Mekki		**e-mail**	salah.ismaeel@uobaghdad.edu.iq
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D
Module Tutor	Dr. Kamal S. Mekki		**e-mail**	Kamal-s@utq.edu.iq
Peer Reviewer Name	Prof. Dr. Adnan A. Ugla		**e-mail**	Adnan-alomary@utq.edu.iq
Review Committee Approval	20 /06/2023		**Version Number**	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	s	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	This module aims to: 1. develop an understanding of the applied metallurgy of principal engineering alloys, to include structure & properties of metals and alloys, Phase diagrams, metal extraction, ferrous materials, heat treatments, 2. provide the background necessary to make informed decisions and recommendations concerning the suitability of metals and alloys for engineering applications. It explores the way in which alloys are used and the way in which production and fabrication routes influence their fitness for purpose. 3. help in understanding the chemical make-up and different macroscopic and microscopic structure. 4. The microstructure of a metal, the structural features that are control to observation under a microscope. 5. Chemical composition is the relative content of a particular element within an alloy, usually expressed as a percent weight. Metals and their alloys are widely used in our daily live		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On completion of the module, the student is expected to:** 1. Gain knowledge and understanding of applied metallurgy (structure, properties, application, etc.). 2. Develop skills in material selection and processes used for physical property manipulation 3. Be able to apply the knowledge gained across a range of industrial sectors. 4. Understand the structures, properties and applications of metals. 5. Apply the acquired knowledge to make appropriate materials selection for engineering applications.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.		

	• Introduction to the structure of metals, reviewing aspects such as crystal structure, mechanical properties, crystal defects and their effects on alloy properties • Application of metallurgical principles in the extraction and processing of iron and aluminium • Theory of diffusion and the phenomenon of mass transport for heat treatments • Phase diagrams (equilibrium and non-equilibrium conditions), focusing on steel phase transformations • Heat treatments, primarily for steel alloys; hardening, softening and conditioning
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning: Gain knowledge and understanding of applied metallurgy Exhibit knowledge of fundamental materials science over a range of common engineering alloys Demonstrate understanding of heat treatments, corrosion science and welding engineering Develop skills in material selection and processes used for physical property manipulation Demonstrate understanding and application of material selection principles Evidence competence in applying advanced strategies for material and process selection Be able to apply knowledge across several industrial sectors Present understanding of diverse heat treatment processes within an industrial context Exhibit knowledge of the degradation phenomena influencing a variety of engineering materials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
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	3	10% (10)	5, 10, 15	
	Assignments	2	5% (5)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	
Summative assessment	Midterm Exam	2 hr	20% (20)	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
Week 2	Classification of engineering materials
Week 3	Crystal structure
Week 4	Imperfections in crystals
Week 5	Solidification, Cooling Curves, Nucleation, Equilibrium Diagrams
Week 6	Thermal Equilibrium diagrams, Substitution solid solution, Interstitial solid solution, BINARY ISOMORPHOUS SYSTEMS
Week 7	Lever rule
Week 8	Applications on binary phase diagrams
Week 9	Miller indices
Week 10	XRD and Bragg's law
Week 11	Heat Treatment of Steel, Types of Heat Treatment Processes, Annealing
Week 12	Normalizing, Hardening, Tempering, Nitriding, Carburising, Case hardening or surface hardening
Week 13	Alloy Steel, Manganese Steel, stainless steel
Week 14	Austenitic steels, ferritic steels, Martensitic steels, Duplex stainless steels, Precipitation-hardening stainless steel, Tool steel
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
٦	**Material Covered**
Week 1	Lab 1: Introduction to materials properties
Week 2	Lab 2: Sample preparation
Week 3	Lab 3: Microstructure inspection by optical microscopy

Week 4	Lab 4: Heat treatments
Week 5	Lab 5: Heat treatments
Week 6	Lab.6 Microhardness test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering, An Introduction (William D. Callister, Jr.) Engineering Metallurgy by E. C. Rollason, (ELBS)	Yes
Recommended Texts	Introduction to MATERIALS SCIENCE FOR ENGINEERS (James F.Shackelford)	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/Metallurgy-engineering	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	PRPERTIES OF MATERIALS	**Module Delivery**
Module Type	CORE	**Theory**

Module Code	ME105		**Lecture** **Lab** **Practical** **Seminar**	
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UG	**Semester of Delivery**	two	
Administering Department	ME	**College**	ER	
Module Leader	Dr. Adnan A. Ugla	**e-mail**	Adnan-alomary@utq.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	L. Dr. Kamal Sahib M.	**e-mail**		
Review Committee Approval	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 provide an understanding of the classification, properties, and testing methods of engineering materials. 2. To explore the properties of ferrous and non-ferrous metals. 3. To familiarize students with various mechanical tests and the principles of the material properties through application of different loads. 4. To introduce the principles and analysis of tensile test, hardness test, fatigue test, impact test, and creep test.
Module Learning Outcomes	1. Classify engineering materials and describe their mechanical properties. 2. Conduct destructive and non-destructive tests on engineering materials.

مخرجات التعلم للمادة الدراسية	3. Explain the principle of all mechanical loads and their effects on the mechanical tests. 4. Understand the principles and analysis of tension test results. 5. Understand the principles and analysis of impact test results 6. Understand the principles and analysis of fatigue test results. 7. Understand the principles and analysis of creep test results
Indicative Contents المحتويات الإرشادية	Introduction/ physical properties, chemical properties, mechanical properties, Definitions of mechanical properties, mechanical load types, tension test results, impact test results, hardness test results, fatigue test results, creep test results

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Engineering Materials: Classification of engineering materials
Week 2	Ferrous Metals
Week 3	Non-Ferrous Metals
Week 4	Engineering Materials: Destructive and non-destructive tests
Week 5	Physical properties of materials
Week 6	chemical properties of materials
Week 7	Mechanical load classification and definition
Week 8	Mechanical properties definition
Week 9	Tension test

Week 10	Hardness test
Week 11	Fatigue test
Week 12	Impact test
Week 13	Creep test
Week 14	Plastic Industry: Properties and classification of plastics
Week 15	Plastic Industry: thermal and mechanical Properties
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Hardness (Rockwell and Brinell) tests
Week 2	Lab 2: Hardness (Vickers macro and micro hardness) tests
Week 3	Lab 3: tension test
Week 4	Lab 4: tension test
Week 5	Lab 5: impact test
Week 6	Lab 6: fatigue test
Week 7	Lab 6: fatigue test

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

Required Texts	Introduction to Basic Manufacturing Processes and Workshop Technology Book by Rajender Singh https://blogpuneet.files.wordpress.com/2013/07/introduction-to-basic-manufacturing-processes-and-workshop technology.pdf	No
Recommended Texts		
Websites	https://www.aboutmech.com/ https://faculty.uobasrah.edu.iq/faculty/en/1660/teaching	

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	PRINCIPLES OF PRODUCTION PROCESSES	**Module Delivery**

Module Type	CORE		**Theory** **Lecture** **Lab** **Practical** **Seminar**	
Module Code	ME303			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UG	**Semester of Delivery**	ONE	
Administering Department	ME	**College**	ER	
Module Leader	Dr. Adnan A. Ugla	**e-mail**	Adnan-alomary@utq.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	L. Dr. Hamal Sahib M.	**e-mail**		
Review Committee Approval	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	5. To provide an understanding of the classification, properties, and testing methods of engineering materials. 6. To explore the production processes of ferrous and non-ferrous metals, plastics, ceramics, and powder metallurgy. 7. To familiarize students with various casting techniques and the principles of the solidification process. 8. To introduce the principles and analysis of cold and hot working processes, including rolling, extrusion, drawing, and welding technologies.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	8. Classify engineering materials and describe their mechanical properties. 9. Conduct destructive and non-destructive tests on engineering materials. 10. Explain the production processes of cast iron, steel, copper, aluminum, zinc, lead, tin, plastics, ceramics, and powder metallurgy. 11. Understand the principles and analyze force requirements in hot rolling, hot extrusion, and hot drawing processes. 12. Identify different welding processes and their applications. 13. Describe the types and analyze the force requirements in various hot and cold working processes. 14. Explain the principles and processes involved in various casting techniques
Indicative Contents المحتويات الإرشادية	Introduction, Definition / manufacturing systems, manufacturing processes, material selection, metal foundry, casting processes, metal removal processes, machining processes, sheet metal forming, metal deformation, joining processes, welding processes, and powder metallurgy

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا		**Structured SWL (h/sem)** الحمل الدراسي المنتظم للطالب خلال الفصل	
Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا		**Unstructured SWL (h/sem)** الحمل الدراسي غير المنتظم للطالب خلال الفصل	
		Total SWL (h/sem)	

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Engineering Materials: Classification of engineering materials, Mechanical properties of material
Week 2	Engineering Materials: Destructive and non-destructive tests
Week 3	Ferrous Metal Production: Production of cast iron
Week 4	Ferrous Metal Production: Steel production
Week 5	Non-Ferrous Metal Production: Copper metal production
Week 6	Non-Ferrous Metal Production: Aluminum metal production
Week 7	Non-Ferrous Metal Production: Zinc, lead, and tin production

Week 8	Plastic Industry: Properties and classification of plastics
Week 9	Plastic Industry: Plastics production
Week 10	Ceramic Industry: Classification of ceramics, Ceramics production
Week 11	Cold and Hot Working: Principles of cold and hot working processes
Week 12	Hot Rolling: Principles of rolling processes, Rolling types, Force analysis in rolling
Week 13	Drawing Process: Types of hot drawing, Drawing analysis
Week 14	Hot Extrusion: Types of hot extrusion, Force analysis in extrusion
Week 15	Powder Metallurgy: Principles of powder metallurgy, Powder metallurgy production Casting: Casting types, Casting sandy process
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: workshop of sharper machine
Week 2	Lab 2: workshop of drilling machine
Week 3	Lab 3: workshop of lathe machine
Week 4	Lab 4: workshop types of Files Tools
Week 5	Lab 5: workshop of grinding machine
Week 6	Lab 6: workshop of Milling
Week 7	Lab 7: workshop of Carpentry
Week 8	Lab 9: workshop of welding

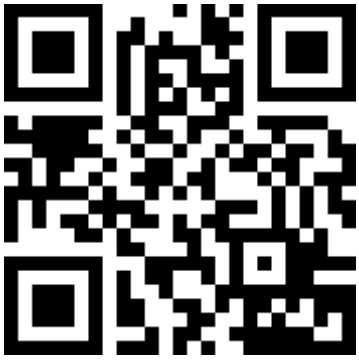
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to materials science Jea P Mercier, Gerald Zambelli, Wilfried Kurz 2002 Edition	No
Recommended Texts	Materials science and engineering: an introduction William D.Callister Wiley 2018	
Websites	https://www.aboutmech.com/ https://faculty.uobasrah.edu.iq/faculty/en/1660/teaching	

APPENDIX:

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

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

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



Ministry of Higher Education and Scientific Research - Iraq

University of Thi-Qar

College of Engineering

Department of Mechanical Engineering

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	METALLURGY	**Module Delivery**	
Module Type	BASIC	**Theory** **Lecture** **Lab/ Practical** **Tutorial** **Seminar**	
Module Code			
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UG	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Kamal S. Mekki	**e-mail**	salah.ismaeel@uobaghdad.edu.iq
Module Leader's Acad. Title	Asst. Professor	**Module Leader's Qualification**	Ph.D
Module Tutor	Dr. Kamal S. Mekki	**e-mail**	Kamal-s@utq.edu.iq
Peer Reviewer Name		**e-mail**	zaid.ahmad@uobaghdad.edu.iq
Review Committee Approval	/06/2023	**Version Number**	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	Properties of Materials	**Semester**	2

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

Module Aims أهداف المادة الدراسية	This module aims to develop an understanding of the applied metallurgy of principal engineering alloys, to include structure & properties of metals and alloys, Phase diagrams, metal extraction, ferrous materials, heat treatments,
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On completion of the module, the student is expected to:** Gain knowledge and understanding of applied metallurgy (structure, properties, application, etc.).

	Develop skills in material selection and processes used for physical property manipulation Be able to apply the knowledge gained across a range of industrial sectors
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to the structure of metals, reviewing aspects such as crystal structure, mechanical properties, crystal defects and their effects on alloy properties • Application of metallurgical principles in the extraction and processing of iron and aluminium • Theory of diffusion and the phenomenon of mass transport for heat treatments • Phase diagrams (equilibrium and non-equilibrium conditions), focusing on steel phase transformations • Heat treatments, primarily for steel alloys; hardening, softening and conditioning
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning: Gain knowledge and understanding of applied metallurgy Exhibit knowledge of fundamental materials science over a range of common engineering alloys Demonstrate understanding of heat treatments, corrosion science and welding engineering Develop skills in material selection and processes used for physical property manipulation Demonstrate understanding and application of material selection principles Evidence competence in applying advanced strategies for material and process selection Be able to apply knowledge across several industrial sectors

	Present understanding of diverse heat treatment processes within an industrial context Exhibit knowledge of the degradation phenomena influencing a variety of engineering materials

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
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**	3	10% (10)	5, 10, 15	
	Assignments	2	5% (5)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	
Summative assessment	**Midterm Exam**	2 hr	20% (20)	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
Week 2	Classification of engineering materials
Week 3	Crystal structure
Week 4	Imperfections in crystals
Week 5	Thermal equilibrium diagrams
Week 6	Lever rule
Week 7	Applications on binary phase diagrams
Week 8	Miller indices
Week 9	XRD and Bragg's law
Week 10	Mechanical properties of metals
Week 11	Carbon steel
Week 12	Alloy steel
Week 13	Cast Iron
Week 14	Heat treatment of steel
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to materials properties
Week 2	Lab 2: Sample preparation
Week 3	Lab 3: Microstructure inspection by optical microscopy
Week 4	Lab 4: Mechanical tests / Tensile
Week 5	Lab 5: Mechanical tests / Hardness / Charpy
Week 6	Lab 6: Heat treatments
Week 7	Lab 7: Heat treatments

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering, An Introduction (William D. Callister, Jr.) Engineering Metallurgy by E. C. Rollason, (ELBS)	Yes
Recommended Texts	Introduction to MATERIALS SCIENCE FOR ENGINEERS (James F.Shackelford)	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/Metallurgy-engineering	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

Ministry of Higher Education and Scientific Research - Iraq

University of Thi-Qar

College of Engineering

Department of Mechanical Engineering

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	ENGINEERING DRAWING +DESCRIPTIVE ENGINEERING	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 104		
ECTS Credits	7		
SWL (hr/sem)	175		

Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Mustafa M. Mansor	**e-mail**	Mustafa.muhammedali @utq.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

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	Provide students with: An understanding of the definition, necessary backgournd and importance of the subject of Mechanical Eng. Drawing, apply the basic terminology, concepts, principles and theories of it in order to: • Be able to draw mechanical elements, • Be able to apply geometrical and dimensional tolerances, • Practice assembly drawings,

	• Be able to use drawing software packages for drawing both mechanical elements and assembly drawings. Skills of hand drawing of sketches.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply knowledge of mathematics, science, and engineering 2. Design a system, component, or process to meet desired needs 3. Use the techniques, skills, and modern engineering tools necessary for engineering practice
Indicative Contents المحتويات الإرشادية	• Introduction to drawing, • engineering drawing / line tools and types of lines, • engineering operations, projections, 1-Semi-straight line 2- Divide the line into a number of equal parts 3- Draw a straight line parallel to another line 4- Draw a straight line parallel to another straight line using the triangle and the letter T ruler 5- Divide the angle 6- Divide an angle into a number of equal parts 7- Draw a regular triangle given the sides 8- Draw an arc touching two straight lines 9- Draw an arc touching another arc and a straight line 10- Draw an arc that touches two other arcs 11 - Draw a regular pentagon 12 - Draw a regular hexagon 13- Divide the circle into seven equal parts 14- Divide the circle into eight equal parts 15- Draw an ellipse using the four-center method • Truncated projections, reproduction of an unknown projection of a known projection (the third projection), • dimensioning on the projections, • Free drawing, stereoscopic drawing, reproduction of figures from projections, cutting in figures, dimensions in figures
Learning and Teaching Strategies	

استراتيجيات التعلم والتعليم	
Strategies	Skills of using a drafting package. Geometrical and dimensional tolerances. Applications on mechanical elements (bolted, welded and riveted joints, shafts and keys, springs, gears). Applications on assembly and working drawings (valves, presses etc.) Descriptive geometry and methods of projection, Projection of point, Projection of straight line, Projection plane surface, Auxiliary planes, Development, Application.

Student Workload (SWL)

الحمل الدراسي للطالب

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	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

As		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	20% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	40% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to drawing,
Week 2	engineering drawing / line tools and types of lines,
Week 3	line tools and types of lines +Descriptive geometry
Week 4	engineering operations
Week 5	engineering operations + methods of projection,
Week 6	engineering operations +Projection of point .
Week 7	Mid-term Exam+, Projection of straight line,
Week 8	projections
Week 9	projections + Projection plane surface
Week 10	Truncated projections
Week 11	reproduction of an unknown projection of a known projection (the third projection)
Week 12	dimensioning on the projections
Week 13	Free drawing, stereoscopic drawing+ Auxiliary planes, Development, Application

Week 14	reproduction of figures from projections, cutting in figures, dimensions in figures
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Textbooks and References • "Engineering Design Graphics", James H. Earle, AutoCAD 2004, Pearson Education Inc.	Yes
Recommended Texts	• "Engineering Drawing" with a primer on AutoCAD, Archad Noor etc. Prentice-Hall 200	No
Websites		

APPENDIX:

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

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

Note:

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	MATHEMATICS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	ER101				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGx11 1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Hayder Abdulhasan Lafta		**e-mail**	hayderlafta@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr. Ahmed Shkara		**e-mail**	Ahmedshkara@utq.edu.iq	
Review Committee Approval	12/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims			

أهداف المادة الدراسية	1. To develop problem solving skills and understanding of mathematics theory through the application of techniques. 2. To understand how function and its draw. 3. This course deals with the basic concept of functions and its behavior. 4. This is the basic subject for all mathematics and calculus subject. 5. To understand the derivative and integral problems. 6. To perform methods of integration analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	2. Recognize how function works and its slope. 3. Discuss the various problems about the real numbers and equations of lines and inequalities. 4. Summarize what is meant by a basic Algebra. 5. Discuss the analysis of graphs of functions. 6. Describe the inverse, exponential and logarithmic functions. 7. Define the systems of matrices. 8. Identify the basic derivatives and their applications. 9. Discuss the operations of integral and numeric integral. 10. Discuss the various problems of integral and its application. 11. Explain the methods of integration.
Indicative Contents المحتويات الإرشادية	None
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction – algebraic functions and its inverse.
Week 2	Linear functions, Equations and inequalities
Week 3	Limits and continuity
Week 4	Derivative and it's applications
Week 5	Hyperbolic functions
Week 6	Introduction to Integral
Week 7	Applications of integration.
Week 8	Introduction to methods of integration
Week 9	Methods of integration
Week 10	Methods of integration
Week 11	Methods of integration
Week 12	Matrices and determinants
Week 13	Numerical method to solve non-linear algebraic equations
Week 14	Trapezoidal and Simpsons rule
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Thomas, G.B., Finney, R.L., Weir, M.D. and Giordano, F.R., 2003. *Thomas' calculus*. Reading: Addison-Wesley.	Yes
Recommended Texts	Hornsby, J., Lial, M.L. and Rockswold, G.K., 2011. *A Graphical Approach to Algebra and Trigonometry*. Addison Wesley.	No
Websites		

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ENGINEERING MECHANICS (DYNAMICS)			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME103				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGx11 2		**Semester of Delivery**	4	
Administering Department			**College**		
Module Leader	Dr. Ahmed A. Ouda		**e-mail**	Ouda1978@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Assist Prof. Dr. Ahmad J. Sh.		**e-mail**	shakarah@utq.edu.iq	
Review Committee Approval	11/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ER101 ER103 ME103	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	The main objectives of the course are to: 7. The application of analytical techniques to the solution of important engineering dynamics problems. It aims to develop the student understanding and their ability to solve advanced dynamics problems related to machine dynamics and vibration.		

	8. The deformation and failure of statically loaded engineering materials and structures and the analytical procedures that can be utilised to preclude such failures. This part aims to enhance the student understanding of the deformation and failure of statically loaded engineering materials and structures and the analytical procedures that can be utilised to preclude such failures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successfully completing the module students will have knowledge and understanding of: 1. kinematics and kinetics of rigid bodies 2. dynamic equations of motion for rigid bodies in 2D and 3D 3. analysis of dynamic forces of mechanisms 4. work and energy 5. vibration theory with its applications to engineering problems
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - kinematics and kinetics of particles; - dynamic equations of motion for rigid bodies in two dimensions; - equations of motion for rigid bodies in three dimensions; - response of linear systems to general loading, damping, force transmission; - two degree of freedom systems: Gears (Spur, Helical, Bevel and Worm Gears); - Vibration of discrete and continuous systems, Vibration of continuous systems;
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, in-class examples and exercises Homework, exams, final exam.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (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

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)		
	Homeworks	5	10% (10)		
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2 hr	20% (10)		
	Final Exam	2hr	60% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction
Week 2	Dynamics of Particles
Week 3	Dynamics of Particles
Week 4	Work and energy of Particles
Week 5	Work and energy of Particles

Week 6	3D Dynamics of Particles
Week 7	3D Dynamics of Particles
Week 8	3D Work and energy of Particles
Week 9	3D Work and energy of Particles
Week 10	Dynamics of Rigid Bodies
Week 11	Dynamics of Rigid Bodies
Week 12	Work and energy of Rigid Bodies
Week 13	Work and energy of Rigid Bodies
Week 14	3D Dynamics of Rigid Bodies
Week 15	**Preparatory Week**
Week 16	**Final Exam**

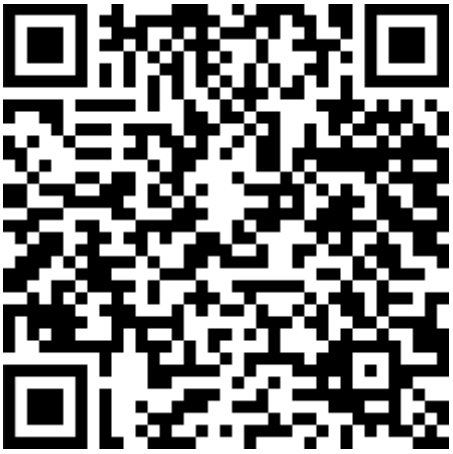
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Kinematics, Dynamics, and Design of Machinery; Kenneth J. Waldron, Gary L. Kinzel, Sunil K. Agrawal, Wiley, 2016 Kinematics and Dynamics of Machinery; Robert L. Norton, McGraw Hill, 2009	Yes
Recommended Texts		No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering	

APPENDIX:

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

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



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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	ENGINEERING MECHANICS I - STATIC I	**Module Delivery**

Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME103				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGx11 1	**Semester of Delivery**		2
Administering Department			**College**		
Module Leader	Dr. Ahmed A. Ouda		**e-mail**	Ouda1978@utq.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Assist Prof. Dr. Ahmad J. Sh.	**e-mail**	shakarah@utq.edu.iq	
Review Committee Approval		11/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main objectives of the course are to: 9. Provide a thorough understanding of the principles governing the forces applied on objects in equilibrium. 10. Provide the necessary tools and mathematical background for the analysis of objects in equilibrium. 11. Develop problem-solving skills for a wide variety of practical engineering problems that involve objects at rest. 12. Introduce techniques and methodologies for the effective analysis of objects and structures at rest. 13. Introduce the concepts of supports and loads that are acting on a structural system under equilibrium conditions.

	14. Develop the ability to determine internal and external forces and bending moments of structures and machines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completion of the course students are expected to: 12. Use free-body diagrams and apply vector analysis to solve equilibrium problems for particles or rigid bodies in two- and three-dimensional space. 13. Use techniques to determine the forces acted on members of trusses and machines in equilibrium. 14. Determine whether an object is statically indeterminate. 15. Use integration and geometrical computations to calculate centroids of lines, areas, and volumes. 16. Calculate internal forces and bending moment of members in equilibrium. 17. Determine the moment of inertial of areas by integration and parallel-axis theorem. 18. Solve problems involving non-uniform loads and friction.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Overview of vectors Free-body diagrams System of forces and moments Objects in equilibrium (2-D and 3-D problems) Structures in equilibrium including trusses, frames and machines Centroids and centers of mass Moments of inertial including parallel-axis theorem Distributed forces and loads including internal forces (shear force, axial force, and bending moment) Friction Virtual work and potential energy
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, in-class examples and exercises Homework, exams, final exam.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
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

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)		
	Homeworks	5	10% (10)		
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	20% (10)		
	Final Exam	2hr	60% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction (Chapter 1 in Textbook)
Week 2	Statics of Particles (Chapter 2)
Week 3	Statics of Particles (Chapter 2)
Week 4	Rigid Bodies: Equivalent System of Forces (Chapter 3)
Week 5	Rigid Bodies: Equivalent System of Forces (Chapter 3)
Week 6	Equilibrium of Rigid Bodies (Chapter 4)
Week 7	Equilibrium of Rigid Bodies (Chapter 4)
Week 8	Analysis of Trusses (Chapter 6)
Week 9	Analysis of Trusses (Chapter 6)
Week 10	Analysis of Beams (Chapter 7)
Week 11	Analysis of Beams (Chapter 7)
Week 12	Friction (Chapter 8)
Week 13	Geometric Properties of Surfaces (Chapter 5 and Chapter 9)
Week 14	Geometric Properties of Surfaces (Chapter 5 and Chapter 9)
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

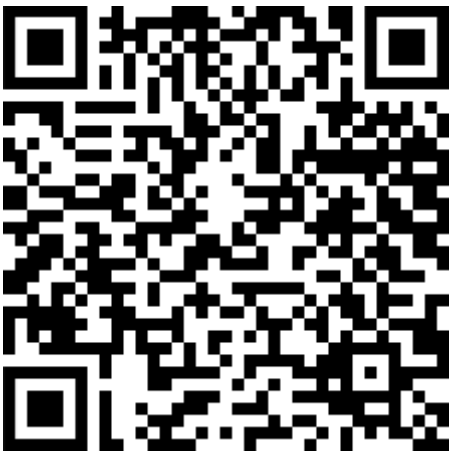
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Engineering Mechanics-Statics, 3rd SI Ed., Hibbeler, R. C., Prentice Hall, 2005. 2. Engineering Statics, 3rd SI Ed., Meriam J. L., Kraige L. G., John Wiley, 2003.	Yes
Recommended Texts	Vector Mechanics for Engineers–Statics, 7th SI Ed., Beer F. P., Johnston E. R. and Eisenberg E. R., McGraw-Hill, 2004.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering	

APPENDIX:

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

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

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



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	BASICS OF ENGLISH LANGUAGE		**Module Delivery**	
Module Type	SUPLEMENT		**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	UR 102			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	١UGx11		**Semester of Delivery**	2
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader	Sarah Rabeea Nashee		**e-mail**	
Module Leader's Acad. Title			**Module Leader's Qualification**	Ph.D.
Module Tutor	None		**e-mail**	Sara.rabee@utq.edu.iq
Peer Reviewer Name	Ahmed j. Shkara		**e-mail**	
Review Committee Approval	03/06/2023		**Version Number**	1.0

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

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

Module Aims أهداف المادة الدراسية	1. To develop students' English language skills 2. To strengthen speaking and listening in English 3. Facilitate the learning of engineering specialization by mastering the English language to accept many educational resources related to engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develops speaking and discussion skills in English 2. The ability to form complete sentences in different tenses and to suit the dialogue time 3. Writing formal and informal letters 4. Mastering English grammar with the correct spelling of words
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Parts of speech (nouns, pronouns, verbs, adverbs, prepositions, conjunctions, with learning the structure of the sentences, quiz 4 hour interjections); kinds of sentences (simple, compound, complex); subordinate clauses; 4 hour change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. 4 hour Modal verbs 2 hour prefixes and suffixes 2 hour Politely request 2 hour

	Conjuctions 2 hour

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome

Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	none			
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Parts of speech (nouns, pronouns, verbs, adverbs, prepositions L1
Week 2	Parts of speech (nouns, pronouns, verbs, adverbs, prepositions L2
Week 3	Interjections l1
Week 4	Interjections L2
Week 5	change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. L1
Week 6	change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. L2
Week 7	Verbs
Week 8	Mid-term Exam
Week 9	Writing the essay or article l1
Week 10	Writing the essay or article l1
Week 11	Modal verbs
Week 12	prefixes and suffixes

Week 13	Politely request
Week 14	Conjunctions
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	English Grammar, Raymond murfy, 1985	No
Recommended Texts	English structure , 2020	No
Websites	https://www.examveda.com/competitive-english/practice-mcq-question-on-grammar/	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	ELECTRICAL CIRCUITS	Module Delivery
Module Type	CORE	☒Theory ☒Lecture ☒Lab ☐Tutorial ☐Practical ☐Seminar
Module Code	UoB12345	
ECTS Credits	8	
SWL (hr/sem)	200	

Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Name	**e-mail**	E-mail
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

نرى ان اللغة العربية هي لغة بينية ومتداخلة وذات صلة بجميع العلوم الاخرى لا سيما وانها اكتسبت قداستها لارتباطها الوثيق بالقرآن الكريم، وقال ابن كثير معللاً اختيار العربية لغة للقرآن الكريم: «وذلك لأن لغة العرب أفصح اللغات وأبينها وأوسعها، وأكثرها تأدية للمعاني التي تقوم بالنفوس؛ فلهذا أنزل أشرف الكتب بأشرف اللغات»[٤]. كما أن «اختيار الله للعربية، أو اللسان العربي، ليكون أداة التوصيل، ووسيلة الإبانة، ووعاء التفكير لها.

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1.التعرّف على مواطن الجمال في اللّغة العربيّة وآدابها، وأن يكتسب الطالب القدرة على دراسة فروع اللّغة العربيّة. 2.تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام 3.تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير. 4.تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم 5.تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. 6.تعويد الطلاب على قواعد الحديث واحترام الرأي الآخر وكذلك التغلب على عامل الخجل.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.الاهداف المعرفية 2.تذكر المعلومات التي درسها واستدعاؤها عند الحاجة 3.فهم المعلومات والشروح التي تفسر بعض الظواهر اللغوية والأدبية 4.تطبيق جميع ما تعلمه ودرسه الطلبة في حياتهم العملية 5.تحليل المشكلة او الموضوع الذي يتالف من اجزاء مختلفة ودراستها 6.تركيب اجزاء الجملة لمعرفة معنى كل جزء على حدة مع الاطلاع على المفاهيم الأدبية والأغراض الشعرية
Indicative Contents المحتويات الإرشادية	اللغة العربيّة أو لغة الضاد هي واحدة من أكثر اللغات انتشاراً ضمن مجموعة اللغات الساميّة، في دول الوطن العربي إضافةً للعديد من المناطق الأخرى مثل تركيّا، والأحواز، ومالي وتشاد، والسنغال، وإثيوبيا، وأريتيريا، وإيران، وجنوبي السودان. اللغة العربيّة تعتبر لغةً مقدسة على اعتبار أنها لغة القرآن، حيث لا تتم الصلاة والعبادات الأخرى في الدين الإسلامي إلا بإتقان اللغة العربيّة، كما أنها لغة شعائريّة لدى عددٍ من الكنائس المسيحيّة على امتداد الوطن العربي، وقد تمّت كتابة العديد من الأعمال الفكريّة والدينيّة اليهوديّة بها وتحديداً في العصور الوسطى. كان لانتشار الدين الإسلامي تأثيراً مباشراً وغير مباشر في رفع شأن ومكانة اللغة العربيّة، حيث أصبحت لغة العلم والأدب والسياسة لأزمنةٍ طويلة في الديار التي حكمها المسلمون، بالإضافة لهذا فقد كان للغة العربيّة تأثيرٌ كبير على عددٍ من اللغات الأخرى على امتداد العالم الإسلامي.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	1.إثارة اسئلة متنوعة يمكن عبرها استدعاء المعلومات 2.شرح موضوع ما عبر مصادر متنوعة ومحاولة ربط المصادر بعضها ببعض 3.مشاهدة بعض البرامج والندوات العلمية والمؤتمرات العلمية والتربوية

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	**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	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

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

Learning and Teaching Resources

مصادر التعلم والتدريس

1.شرح ابن عقيل

2.معجم اللغة العربية

3.شذا العرف في فن الصرف

4.كتب الادب والشعر

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.

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	PRINCIPLES OF COMPUTER SCIENCE	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 102		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department	ME	**College**	ER
Module Leader	Dr.Ahmed jassim shkaraj	**e-mail**	shkarah@utq.edu.iq
Module Leader's Acad. Title	Assist.Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Ahmed ouda	**e-mail**	ouda1978@gmail.com
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

Module Aims أهداف المادة الدراسية	The theoretical foundations of computer engineering have expanded substantially in recent years. The objective of this course is to introduce students to this fundamental area of computer science which enables students to focus on the study of programming languages. These languages allow the students to assess what could be achieved through computing when they are using it to solve problems in science and engineering. The course exposes students to the programming with C++, as well as to its usage for problem solving. The course introduces basic programming instructions

	and their properties, and the necessary mathematical libraries to develop different software applications. Upon completion of this course the students are expected to become proficient in key topics of C++ programming, and to have the opportunity to explore the current topics in this area.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of programming in C++ 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	1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, and plasma screens. 3. Self-learning through homework and mini-projects within the lectures.

	4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars held in the department.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2,
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8
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	Introduction to computer fundamentals
Week 2	Introduction-Algorithms-Example of Algorithms
Week 3	Flowcharts-Symbols and Idiomatic Forms in Flowcharts- Types of Flowcharts
Week 4	Completing the topic of Flowcharts type-Example of Flowcharts
Week 5	Basics of programming in C++ language program parts- language components (language codes, special words, variables)
Week 6	Office functions, types of variables, logical expressions
Week 7	Arithmetic tools- priority of arithmetic and logical operations- illustrative examples
Week 8	Input and output order- Directing characters- Formatted console for input and output operations
Week 9	Completing the Formatted console for input and output operations- illustrative examples
Week 10	Conditional Statements (if statement- if-else statement-if-else-if statement-Compound if)
Week 11	Loop Statements (for-statement, while-statement- do-while statement-illustrative examples)
Week 12	Loop Statements (Nested Loop Statements- illustrative examples)
Week 13	One-Dimensional Arrays-illustrative examples
Week 14	Two- Dimensional Arrays- Operations on Arrays
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Steps to create, compile and implement a program using Microsoft visual C++ 6.0
Week 2	Lab 2: Implement programs for conditional statements (if-statement)
Week 3	Lab 3: Implement programs for conditional statements (switch-statement)
Week 4	Lab 4: Implement programs for Loop statements (for-statement)
Week 5	Lab 5: Implement programs for conditional statements (while-statement, do-while-statement)
Week 6	Lab 6: Implement programs for Array (one dimension)
Week 7	Lab 7: Implement programs for Array (two-dimension)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		No
Websites		

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	STRESSES ANALYSIS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical**	
Module Code	ME204				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGx11 UGII		**Semester of Delivery**	4	
Administering Department	ME		**College**	ER	
Module Leader	Dr. Kadhim M. Alsahlani		**e-mail**	KadhimAlsahlani@utq.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Kadhim M. Alsahlani		**e-mail**	KadhimAlsahlani@utq.edu.iq	
Peer Reviewer Name	Talib EH Elaikh		**e-mail**	Talib-h@utq.edu.iq	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Strength of Materials	**Semester**	Three
Co-requisites module		**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	The objective of analysis will be the determination of the stresses, strains, and deformations produced by the loads that applied on the solid bodies include axially-loaded bars, shafts, beams, and columns. A thorough understanding of the fundamentals of this subject is of vital importance because many of the formulas and rules of design		

	cited in engineering codes are based upon the principles of this subject. The aims of this module are: 19. To determine the stress distribution in beams including find the maximum bending stress and its location for better beam design. 20. Learn how to find the direct shear stress distribution in beams including the maximum shear stress and its location. 21. Describe the slope and deflection in beams using different methods like integration method or discontinuity method. 22. Discuss the stresses in the composite beams that made of two different materials. 23. Describe the stresses distribution in the curved beams and how to apply developed flexure formulas or combine stresses to design any curved member. 24. Identify combined stresses and study some of applications subject to combined loads e.g. shear, normal and bending load. 25. Explain the stresses at point using the mathematical equations or using Mohr's circle including find the principal stresses and the maximum shear stress with their orientations. 26. Define the columns support axile loads and their buckling formulas. 27. Identify the important failure theories that affect the design of the mechanical components.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By successfully completion of this module, the student will be expected to be able to: 1- Identify list of the various terms associated with stress analysis to design the mechanical components. 2- Determine the maximum bending stress and maximum shear stress and their locations along loaded beams. 3- Find the slope and deflection in loaded beans. 4- Design curved beam subjected to flexure or combine load. 5- Analysis stress at point to find the important mechanical properties which is critical for design like principals' stresses and maximum shear stresses. 6- Understand the buckling in columns. 7- Apply failure theories to design mechanical components.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Stresses in Beams and Shear Stresses in Beams. (7hours) Slope and Deflection in Beams by integration Method and by Discontinuity Method. (15 hours) Composite Beams. (6 hours) Curved Beams. (6 hours) Combine Stresses. (8 hours) Combine Stresses (6 hours) Stresses at Point, Mohr's Circle in Stress and Mohr's Circle in Strain. (15)

	Columns. (6 hours) Theories of Failure. (6 Hours)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some practical tests. Encourage students to solve some selected homework from refences to practice solving engineering problems using stresses analysis route.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	146 + 4 hours (Final exam) = 150 hours/sem		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4, 6	LO #2, 4 and 6
	Assignments	2	5% (5)	4, 14	LO # 3, 5, 8 and 14
	Report	1	10% (10)	Continuous	
	Projects / Lab.	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	30% (30)	8	LO # 1-7
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Stresses in Beams
Week 2	Stresses in Beams
Week 3	Shear Stresses in Beams
Week 4	Slope and Deflection in Beams by Integration Methods
Week 5	Slope and Deflection in Beams by Discontinuity Method
Week 6	Slope and Deflection in Beams by Discontinuity Method
Week 7	Composite Beams
Week 8	Curved Beams
Week 9	Combine Stresses
Week 10	Stresses at Point
Week 11	Moher's Circle for Stresses
Week 12	Moher's Circle for Strain
Week 13	Columns
Week 14	Theories of Failure
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Deflection of Simply Supported and Cantilever Beams
Week 2	Lab 1: Deflection of Simply Supported and Cantilever Beams
Week 3	Lab 2: Circular Bending in Beams
Week 4	Lab 2: Circular Bending in Beams
Week 5	Lab 3: Deflection of Curved Beams
Week 6	Lab 3: Deflection of Curved Beams

Week 7	Lab 4: Effect of End Conditions on Buckling Load
Week 8	Lab 4: Effect of End Conditions on Buckling Load
Week 9	Catch up
Week 10	Test

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	MECHANICS OF MATERIALS, Eighth Edition, R. C. Hibbeler	Yes
Recommended Texts	Mechanics of Materials, Singer Mechanics of Materials, Gere Mechanics of Materials, Hearn	No
Websites		

APPENDIX:

GRADING SCHEME
مخطط الدرجات

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

Note:

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

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

MODULE DESCRIPTOR 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**	
Module Code	ME201			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGx11 UGII		**Semester of Delivery**	3
Administering Department	ME		**College**	ER
Module Leader	Dr. Kadhim M. Alsahlani		**e-mail**	KadhimAlsahlani@utq.edu.iq

Module Leader's Acad. Title	lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Kadhim M. Alsahlani	e-mail	KadhimAlsahlani@utq.edu.iq
Peer Reviewer Name	Talib EH Elaikh	e-mail	Talib-h@utq.edu.iq
Review Committee Approval	01/06/2023	Version Number	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics	Semester	Two
Co-requisites module		Semester	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	Strength of materials is a branch of applied mechanics that deals with the behavior of solid bodies subjected to various types of loading. The aims of this subject are: 1- Recognize different types of loads that affects solid bodies include axially-loaded bars, shafts, beams, and columns. 2- Define Hook's law that linked the stress with its strain. 3- Identify the simple stresses in beams which include axile stress, shear stress produces by direct force and bearing stress. 4- Identify the strain including lateral and longitudinal strain and links with Poison ratio. 5- Discuss the effects of applying a torsional loading to a shaft or tube have a circular or noncircular cross section. 6- Determine the external forces and stresses by statically indeterminate methods. 7- Define power transmission by shaft subjected to torque. 8- Identify thin-walled pressure vessels including cylindrical and spherical shapes 9- Identify vessel subjected to fluid pressure 10-Learn how to draw bending and shear force diagrams that distributed along with beam's axle. 11-Explain the thermal stresses in beams that exposed to thermal effect beside the mechanical stresses. 12-Explain the combined stresses and angle of twist of thin-walled tubes having noncircular section subjected to combined loads		

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A thorough understanding of the fundamentals of this subject is of vital importance because many of the formulas and rules of design cited in engineering codes are based upon the principles of this subject. After completing this module, a student will be able to: 28. Recognize different types of loads and stresses that affect loaded beams. 29. Find external forces and stresses in beams that statically indeterminate since the equilibrium equation(s) are not sufficient. 30. Understand the stress distribution within the beam due to torsion load and identify the angle of twist of this beam having circular or noncircular section. 31. Use the statically indeterminate methods to find the reactions, stresses and deflections in beams subjected to torsional or axil loads. 32. Power Transmission in Beams Subjected to Torques. 33. Identify Thermal Stresses in Beams 34. Understand the Principals Design of Thin-Walled Tube and Thin-Walled Pressure Vessels. 35. Draw the Shear Force and Bending Moment Distributed Along the Beams. 36. Understand Combine Loads and the Stresses Result of Them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Materials properties includes modulus of elasticity, modulus of rigidity and Poison's ratio. Practical test includes tensile test (12hours). Simple Stresses, Normal Strain, Shear Stress and Bearing Stress, Shear Strain and Hook's. (15 hours) Statically indeterminate of Reactions, Deflections and Stresses. (5 hours) Torsion and Angle of Twist, Power Transmission and Statically Indeterminate, Torsion of Solid Noncircular Shaft, and Thin-Walled Tube having Close Cross Sections. (20 hours) Thin-Walled Pressure Vessels and Vessels Subjected to Fluid Pressure. (8 hours) Shear and Moment Diagrams by Sections Method, and Graphical Method for Constructing Shear and Moment Diagram. (15 hours)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering

	this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some practical tests. Encourage students to solve some selected homework from refences to practice solving engineering problems using stresses analysis route.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	146 + 4 hours (Final exam) = 150 hours/sem		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4, 10	LO #2, 4, 9 and 10
	Assignments	2	5% (5)	6, 12	LO # 3, 5, 11 and 12
	Report	1	10% (10)	Continuous	
	Projects / Lab.	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	30% (30)	8	LO # 1-7
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Simple Stresses and Normal Strain

Week 2	Shear Stress and Bearing Stress
Week 3	Shear Strain and Hook's Law
Week 4	Modulus of Rigidity and Pointon's Ratio
Week 5	Statically indeterminate of Reactions, Deflections and Stresses.
Week 6	Thermal Stresses
Week 7	Torsion and Angle of Twist
Week 8	**Midterm Exam**
Week 9	Power Transmission and Statically Indeterminate in Beams Subjected to Torsion Loads.
Week 10	Torsion of Solid Noncircular Shaft
Week 11	Thin-Walled Tube having Close Cross Sections.
Week 12	Thin-Walled Pressure Vessels and Vessels Subjected to Fluid Pressure.
Week 13	Shear and Moment Diagrams by Sections Method.
Week 14	Graphical Method for Constructing Shear and Moment Diagram
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Tensile Test
Week 2	Lab 1: Tensile Test
Week 3	Lab 2: Torsion test
Week 4	Lab 2: Torsion test
Week 5	Lab 3: Shear Centre in Unsymmetric Beams
Week 6	Lab 3: Shear Centre in Unsymmetric Beams
Week 7	Catch up
Week 8	Test

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	MECHANICS OF MATERIALS, Eighth Edition, R. C. HIBBELER	Yes
Recommended Texts	Mechanics of Materials, Singer Mechanics of Materials, Gere Mechanics of Materials, Hearn	No
Websites	https://classroom.google.com/u/0/h	

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	MATHEMATICS		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	ER201			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGx11 1		**Semester of Delivery**	3

Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Hayder Abdulhasan Lafta	**e-mail**	hayderlafta@utq.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Ahmed Shkara	**e-mail**	Ahmedshkara@utq.edu.iq
Review Committee Approval	12/06/2023	**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	15. To develop problem solving skills and understanding of mathematics theory through the application of techniques. 16. To understand how function of several variables. 17. This course deals with the basic concept of multivariable functions and its behavior. 18. This is the basic subject for partial derivatives and its applications. 19. To understand the derivative and integral problems. 20. To perform ordinary differential equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	37. Recognize how function of several variable works . 38. Discuss the various problems about the real numbers and equations of lines and inequalities. 39. Summarize what is meant by a basic Algebra. 40. Discuss the analysis of graphs of functions.

	41. Describe the series and its applications. 42. Define the ordinary differential equations. 43. Identify the basic of complex numbers. 44. Discuss the operations of integral and numeric integral. 45. Discuss the various problems of numerical solutions of O.D.E. 46. Explain the methods of Euler and Range Cuta.
Indicative Contents المحتويات الإرشادية	None
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction – functions of several variables.
Week 2	Limits partial derivatives
Week 3	Limits and continuity
Week 4	Directional Derivative
Week 5	Tangent plane and normal line extra
Week 6	Lagrange multipliers
Week 7	Double and triple integrals
Week 8	Double and triple integrals and its applications
Week 9	Complex numbers

Week 10	Series solutions and power series
Week 11	Ordinary differential equations
Week 12	Linear systems of differential equations
Week 13	Numerical method to solve O.D.E equations
Week 14	Euler and Range cuta method
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

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

Required Texts	Thomas, G.B., Finney, R.L., Weir, M.D. and Giordano, F.R., 2003. *Thomas' calculus*. Reading: Addison-Wesley.	Yes
Recommended Texts	Hornsby, J., Lial, M.L. and Rockswold, G.K., 2011. *A Graphical Approach to Algebra and Trigonometry*. Addison Wesley.	No
Websites		

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	THERMODYNAMICS	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME202		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGx11 2	**Semester of Delivery**	1

Administering Department	ME	**College**	ER
Module Leader	Dr. Mohammed D. Salman	**e-mail**	Dr.mohzaidi@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Prof.Dr.khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	21. Introducing the students to the laws of thermodynamics. 22. Identifying thermodynamic systems. 23. Understanding the phase change of material and apply it in producing energy. 24. Knowing the ideal and real gas laws and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	:Upon completion of the course student should be able to 47. Apply the acquired theoretical professional knowledge in thermodynamic engineering.

	48. Apply mathematical method in the analysis of closed , open and an isolated systems. 49. Explain phase change diagram of materials. 50. Derive the first law of thermodynamic to know the relation between heat and work and energy types. 51. Knowing thermodynamic processes for open and closed systems . 52. Analyze of steady and unsteady state processes in flow processes.
Indicative Contents المحتويات الإرشادية	Introduction, Definition / force / pressure, Energy / resource / uses, Heat / work / power, Internal energy / enthalpy / zeroth law, Temperature and its measurement, First law of thermodynamics / perpetual motion machine, Boyles law / Charles law, Equation of state / closed system processes, Constant volume pressure and processes, Adiabatic and polytrophic processes, Open system processes / steady flow energy equation , and its application.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encouraging student participation in thermodynamics exercises requires a combination of effective teaching strategies and engagement techniques specific to the subject matter. Here's a strategy to promote active participation in thermodynamics exercises: 1- Set clear learning goals and outcomes: • Clearly communicate the learning objectives of the thermodynamics exercises. • Explain the relevance of thermodynamics concepts to real-world applications, emphasizing their importance in various engineering fields. 2- Break down complex concepts:

	• Start with foundational concepts and gradually build up to more advanced topics • Use analogies, visual aids, and real-life examples to help students grasp abstract thermodynamics principles. • Provide step-by-step explanations and guide students through problem-solving techniques. 3- Provide regular feedback and guidance: • Offer constructive feedback on students' problem-solving approaches, highlighting both correct and incorrect methods. • Provide individualized guidance and support to address students' specific difficulties or misconceptions. • Encourage students to seek clarification or ask questions during exercises, creating an environment where they feel comfortable seeking help. 4- Relate thermodynamics to real-world applications: • Illustrate how thermodynamics concepts are applied in various engineering fields, such as energy systems, chemical processes, or environmental engineering. • Share case studies or success stories that demonstrate the practical significance of thermodynamics principles. • Assign exercises that require students to analyze and solve real-world thermodynamics problems, fostering engagement and motivation. 5- Assess and recognize student participation: • Implement formative assessments, such as quizzes or short exercises, to gauge students' understanding and progress. • Recognize and reward active participation, effort, and improvement in thermodynamics exercises. • Provide opportunities for students to showcase their understanding through presentations or demonstrations.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Basic Concepts & Definitions of Thermodynamics
Week 2	Phase-Change Processes of Pure Substances
Week 3	T-v, P-v & P-T Diagrams of Phase-Change Materials

Week 4	Property Tables of (Steam, Ammonia, R-12, R-22, R-134a & Nitrogen)
Week 5	The Ideal-Gas Equation of State & The Compressibility Factor
Week 6	Forms of Work
Week 7	Mechanical Work, Electrical Work & Heat Transfer
Week 8	The First Law of Thermodynamics for Closed Systems
Week 9	Internal Energy, Specific Heats, Enthalpy & Specific Heats
Week 10	The Continuity Equation
Week 11	The First Law of Thermodynamics for Control Volume (Open System)
Week 12	The First Law for Steady State-Steady Flow Process
Week 13	The First Law for Uniform State-Uniform Flow Process
Week 14	Unsteady state flow
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Thermal expansion of solid bodies Measuring using the expansion apparatus
Week 2	Lab 2: Observing the phase transition betweenthe liquid and the gas phase at the critical point
Week 3	Lab 3: Pressure-dependency of the volume of a gas at a constant temperature (Boyle-Mariotte's law)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Engineering Thermodynamics ,Borgnakke & Sonntag and Wiley	Yes
Recommended Texts	Thermodynamics: An Engineering Approach, 5/e, by Yunus A. Cengel and Michael A. Boles	No
Websites	https://eng.utq.edu.iq/	

APPENDIX:

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

Note:				

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	THERMODYNAMICS APPLICATIONS		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME206			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGx11 2	**Semester of Delivery**	2	
Administering Department	ME	**College**	ER	
Module Leader	Dr. Mohammed D. Salman	**e-mail**	Dr.mohzaidi@utq.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	Prof.Dr.khudheyer S. Mushatet	**e-mail**	khudheyer@utq.edu.iq	
Review Committee Approval	01/06/2023	**Version Number**	1.0	

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	25. Introducing the students to the laws of thermodynamics. 26. Identifying thermodynamic systems. 27. Understanding the phase change of material and apply it in producing energy. 28. Identifying reversible and an irreversible processes.

	29. Finding thermal efficiencies of rankine cycle, air standard cycles and vapor refrigeration cycles. 30. Understanding entropy generation for the ideal gas.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	53. Apply the acquired theoretical professional knowledge in thermodynamic engineering. 54. Apply mathematical method in the analysis of closed , open and an isolated systems. 55. Explain phase change diagram of materials. 56. Know the Reversible and an irreversible process and application 57. Apply entropy change for ideal and real gas. 58. Explain The inequality of clausius application. 59. Analyze thermodynamically of steam power plants and refrigeration cycles. 60. Solve thermodynamic examples and do laboratory experiments as a team
Indicative Contents المحتويات الإرشادية	Reversible and in reversible processes, Heat engine / reversed heat engine, Heat pump, Second law of thermodynamics, Cycle / Carnot cycle, Reversed Carnot cycle, Entropy / clauses in quality, Entropy in reversed processes, Entropy in reversed processes with heat transfer, Entropy in irreversible processes, Entropy in irreversible processes with heat transfer, Gases mixtures / Dalton's law, Avogadro's law / adiabatic mixing of gases.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encouraging student participation in thermodynamics exercises requires a combination of effective teaching strategies and engagement techniques specific to the subject matter. Here's a strategy to promote active participation in thermodynamics exercises: 3- Set clear learning goals and outcomes:

	• Clearly communicate the learning objectives of the thermodynamics exercises. • Explain the relevance of thermodynamics concepts to real-world applications, emphasizing their importance in various engineering fields. 4- Break down complex concepts: • Start with foundational concepts and gradually build up to more advanced topics • Use analogies, visual aids, and real-life examples to help students grasp abstract thermodynamics principles. • Provide step-by-step explanations and guide students through problem-solving techniques. 3- Provide regular feedback and guidance: • Offer constructive feedback on students' problem-solving approaches, highlighting both correct and incorrect methods. • Provide individualized guidance and support to address students' specific difficulties or misconceptions. • Encourage students to seek clarification or ask questions during exercises, creating an environment where they feel comfortable seeking help. 4- Relate thermodynamics to real-world applications: • Illustrate how thermodynamics concepts are applied in various engineering fields, such as energy systems, chemical processes, or environmental engineering. • Share case studies or success stories that demonstrate the practical significance of thermodynamics principles. • Assign exercises that require students to analyze and solve real-world thermodynamics problems, fostering engagement and motivation. 5- Assess and recognize student participation: • Implement formative assessments, such as quizzes or short exercises, to gauge students' understanding and progress. • Recognize and reward active participation, effort, and improvement in thermodynamics exercises. • Provide opportunities for students to showcase their understanding through presentations or demonstrations.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.75
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Reversible and an irreversible process and application

Week 2	Introduction to the Second Law of Thermodynamics: Heat Engine, Refrigerator & Heat Pump
Week 3	Second law of thermodynamic application
Week 4	Entropy
Week 5	Principle of the Increase of Entropy
Week 6	Entropy Change of Ideal-Gas
Week 7	Reversible Steady-Flow Work
Week 8	The inequality of clausius application
Week 9	Adiabatic Efficiency of Steady-Flow Devices
Week 10	Gas Power Cycles; Otto Cycle & Diesel Cycle
Week 11	Ideal Brayton Cycle & Actual Brayton Cycle
Week 12	Vapor Power Cycles; Ideal Rankine Cycles & Actual Rankine Cycle
Week 13	Reheat Cycle
Week 14	Vapor Refrigeration Cycles; Ideal Vapor-Compression Refrigeration Cycle
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Determining the efficiency of the heat pump as a function of the temperature differential
Week 2	Lab 2: Vapor Refrigeration Cycle
Week 3	Lab 3: Determining the specific heat of water

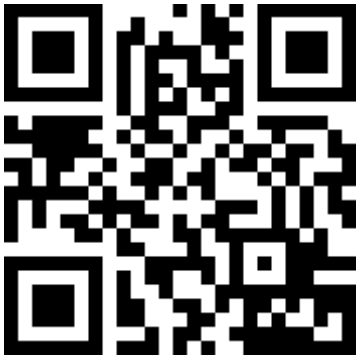
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Engineering Thermodynamics ,Borgnakke & Sonntag and Wiley	Yes
Recommended Texts	Thermodynamics: An Engineering Approach, 5/e, by Yunus A. Cengel and Michael A. Boles	No
Websites	https://eng.utq.edu.iq/	

APPENDIX:

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

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

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



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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	COMPUTER AIDED DESIGN (CAD/CAM)			**Module Delivery**	
Module Type	CORE			√ **Theory** √ **Lecture** √ **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME309				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGIII	**Semester of Delivery**		6
Administering Department		ME	**College**	ER	
Module Leader	Dr.Ahmed Jassim Shkarah		**e-mail**	shkarah@utq.edu.iq	
Module Leader's Acad. Title		Assist.Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name		Dr.Ahmed ouda	**e-mail**	ouda1978@gmail.com	

Review Committee Approval	01/06/2023	Version Number	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1. CAD Fundamentals in Mechanical Engineering: The aim of this module is to provide students with a solid foundation in the principles and concepts of computer-aided design (CAD) specific to mechanical engineering. Students will learn the essential tools and techniques to create accurate and detailed 2D and 3D mechanical models. 2. Parametric Modeling and Design Optimization: This module focuses on developing students' proficiency in parametric modeling and design optimization techniques using CAD software. Students will learn how to create parametric models, apply geometric and engineering constraints, and utilize optimization algorithms to enhance the performance and efficiency of mechanical designs. 3. CAD Integration with Engineering Analysis: The aim of this module is to explore the integration of CAD with engineering analysis tools in mechanical engineering. Students will learn how to prepare CAD models for finite element analysis (FEA), perform stress and thermal analyses, and interpret the results to make informed design decisions. 4. Advanced CAD Applications in Mechanical Engineering: This module aims to expose students to advanced CAD applications specific to mechanical engineering. Topics covered may include advanced surface modeling, complex assembly design, kinematics, and mechanisms. The aim is to equip students with the skills to tackle complex mechanical design challenges using advanced CAD tools and techniques.		
Module Learning Outcomes			

مخرجات التعلم للمادة الدراسية	By the end of this module, students should be able to: 1. Demonstrate a comprehensive understanding of CAD/CAM principles, concepts, and their applications in various industries. 2. Utilize CAD software proficiently to create accurate 2D and 3D models, apply geometric constraints, and generate technical drawings. 3. Effectively use CAM software to generate toolpaths, simulate manufacturing processes, and generate machine instructions for CNC machining. 4. Integrate CAD and CAM processes to optimize design and manufacturing workflows, including transferring CAD models to CAM software and performing design for manufacturability analysis. 5. Apply CAD/CAM technologies for rapid prototyping and additive manufacturing, including selecting appropriate 3D printing technologies and optimizing designs for additive manufacturing processes. 6. Integrate CAD/CAM systems with CNC machining by generating CNC programs, understanding machine operations, and executing machining processes efficiently. 7. Apply engineering analysis techniques to evaluate and optimize mechanical designs using CAD-based finite element analysis (FEA) tools. 8. Demonstrate an understanding of design automation techniques and the ability to create parametric models that can be efficiently modified and updated. 9. Analyze and evaluate the impact of manufacturing constraints on design decisions and optimize designs for efficient manufacturing and assembly. 10. Effectively manage CAD data throughout the product lifecycle, including version control, data sharing, and collaboration using product lifecycle management (PLM) principles.

	11. Apply critical thinking and problem-solving skills to tackle complex mechanical design challenges using advanced CAD tools and techniques. 12. Communicate design ideas and solutions effectively through technical documentation, including technical drawings, reports, and presentations. Note: The specific learning outcomes may vary depending on the educational institution and the level of the course (e.g., undergraduate or graduate). The above learning outcomes provide a general framework of the expected knowledge and skills that students should acquire upon completing a CAD/CAM module.
Indicative Contents المحتويات الإرشادية	1. Introduction to CAD/CAM: - Historical overview of CAD/CAM systems - Benefits and applications of CAD/CAM in various industries - Integration of design and manufacturing processes 2. CAD Software Fundamentals: - User interface and basic tools of CAD software - Creating and editing 2D sketches - Creating 3D models using parametric and direct modeling techniques - Applying geometric constraints and relationships 3. 3D Modeling and Assembly: - Advanced 3D modeling techniques, such as surface modeling and solid modeling - Assembly modeling and constraints - Component libraries and standard parts - Interference checking and clash detection 4. CAM Software Fundamentals: - CAM software interface and navigation - Toolpath generation for different machining operations

	- Tool selection and optimization - Simulation and verification of machining processes 5. CAD/CAM Integration and Design for Manufacturability: - Transferring CAD models to CAM software - Design for manufacturability principles and guidelines - Analyzing and optimizing designs for efficient production - Incorporating manufacturing constraints into the design process 6. Rapid Prototyping and Additive Manufacturing: - Principles and technologies of rapid prototyping - Selecting appropriate 3D printing technologies - Design considerations for additive manufacturing - Prototyping and iterating designs using CAD/CAM tools 7. CNC Machining and CAD/CAM Integration: - Introduction to CNC machining processes - Programming CNC machines using CAD/CAM software - Toolpath generation and optimization for CNC machining - Post-processing and generating machine instructions 8. CAD-based Engineering Analysis: - Introduction to finite element analysis (FEA) principles - Preparing CAD models for analysis - Conducting stress and thermal analysis using CAD-based FEA tools - Interpreting analysis results and making design decisions 9. Advanced CAD/CAM Techniques: - Advanced surface modeling techniques - Complex assembly design and kinematics simulation - Design optimization and parametric modeling techniques

	- Multi-axis machining and toolpath optimization 10. Product Lifecycle Management (PLM) and Data Management: - Introduction to PLM systems and their role in CAD/CAM - Managing CAD data throughout the product lifecycle - Version control, data sharing, and collaboration - Documenting and archiving CAD/CAM data
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and Teaching Strategies for CAD/CAM (Computer-Aided Design/Computer-Aided Manufacturing) can include a combination of the following approaches: 1. Lectures: Provide theoretical foundations and introduce key concepts, principles, and techniques of CAD/CAM. Lectures can also include demonstrations of software features and functionalities. 2. Practical Sessions: Hands-on practice using CAD/CAM software is crucial for developing proficiency. Practical sessions allow students to apply their knowledge and skills to create 2D and 3D models, generate toolpaths, and simulate manufacturing processes. 3. Case Studies and Real-world Examples: Incorporate real-world case studies and examples to demonstrate the application of CAD/CAM in various industries. Analyze and discuss the challenges and solutions encountered in practical scenarios. 4. Group Projects and Collaborative Learning: Assign group projects that require students to work together on complex CAD/CAM design and manufacturing tasks. This encourages collaboration, problem-solving, and communication skills.

	5. Workshops and Tutorials: Conduct workshops and tutorials to provide additional support and guidance for specific CAD/CAM software tools and techniques. These sessions can focus on advanced features, optimization strategies, or specific applications. 6. Industry Guest Speakers: Invite industry professionals or guest speakers who have expertise in CAD/CAM to share their experiences, best practices, and insights. This provides students with real-world perspectives and enhances their understanding of industry expectations. 7. Online Resources and Interactive Platforms: Utilize online resources, video tutorials, and interactive platforms to supplement classroom learning. These resources can include software documentation, online forums, and virtual simulations to enhance student engagement and self-paced learning. 8. Assessments and Feedback: Assign assessments that require students to demonstrate their CAD/CAM skills and knowledge. Provide constructive feedback to guide students' improvement and reinforce their understanding of concepts and techniques. 9. Field Trips and Industry Visits: Organize field trips or industry visits to CAD/CAM facilities or manufacturing plants. This allows students to observe CAD/CAM systems in action, interact with professionals, and gain practical insights into the real-world implementation of CAD/CAM. 10. Continuous Evaluation and Reflection: Encourage students to reflect on their learning progress throughout the module. Periodically review and evaluate their work, provide feedback, and encourage self-assessment to enhance their understanding and skill development. It is essential to adapt and combine these strategies based on the specific needs and resources available, as well as the learning objectives of the CAD/CAM module.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	

	Introduction to CAD/CAM: Overview, historical background, and applications - Introduction to CAD software: User interface, basic tools, and functionalities - Introduction to 2D sketching and drawing -
Week 2	Design process and application of cad
Week 3	Geometric modeling
Week 4	Design software package
Week 5	Modeling techniques
Week 6	Stress analysis
Week 7	Read information by using OBD techniques
Week 8	CNC Machining: Introduction to CNC machines, programming basics Toolpath optimization and post-processing for CNC machining -
Week 9	Introduction for G/code
Week 10	Programming the solution and example
Week 11	Element of CAD/CAM interstate
Week 12	CNC software applications
Week 13	Advanced CAD Techniques: Advanced surface modeling, complex assembly design, and kinematic simulation
Week 14	Product Lifecycle Management (PLM) and Data Management: Introduction to PLM systems, CAD data management, version control, and collaboration
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

Week 1	Lab 1: Introduction to CAD Software Familiarization with CAD software interface - Basic 2D sketching and drawing exercises -
Week 2	Lab 2: 2D Sketching and Constraints Creating and editing 2D sketches - Applying geometric constraints to sketches -
Week 3	Lab 3: Assembly Modeling - Creating 3D assemblies - Applying assembly constraints -
Week 4	Lab 4: Introduction to CAM Software - Familiarization with CAM software interface - Generating toolpaths for 2D machining operations -
Week 5	Lab 5: CNC Machining Introduction to CNC machines and programming basics -
Week 6	Generating toolpaths and post-processing for CNC machining Lab6:
Week 7	Lab 7: G code examples

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**

Required Texts	CAD/CAM: Principles and Applications" by P. N. Rao	Yes
Recommended Texts	CAD/CAM: Concepts and Applications" by Chennakesava R. Alavala	No
Websites		

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

Note:

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	TURBOMACHINERY		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME315			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGx11 1		**Semester of Delivery**	1
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader	Dr. Mohsen H. Fagr		**e-mail**	mohsenfagr@utq.edu.iq
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.
Module Tutor	None		**e-mail**	None
Peer Reviewer Name	Dr. Ahmed J. Shkara		**e-mail**	shkara@utq.edu.iq
Review Committee Approval	01/06/2023		**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fluid 1	**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	31. To develop problem solving skills and understanding of turbomachine theory through the application of techniques. 32. To understand how power, flow rate and head are developed in turbomachine. 33. This course deals with the basic concept of turbomachines. 34. This is the basic subject for all turbomachines subject. 35. To understand the theoretical and actual head – discharge relations in pumps. 36. To perform mathematical analysis in turbomachines.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	61. Recognize how turbomachines work. 62. List the various terms associated with turbomachines. 63. Summarize what is meant by a basics of turbomachines. 64. Describe power and efficiency of turbomachines. 65. Identify the turbomachines elements and their applications. 66. Discuss the operations of turbomachines. 67. Explain the problems analysis in pumps. 68. Identify the types of pumps and turbines. 69. Identify the different between pumps and turbines. 70. The ability of solving the mathematical exercises of turbomachines.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Introduction to turbomachines, fundamentals of turbomachines. The different between turbines and pumps. [10 hrs] turbines. Types of turbines. turbines and their analysis. [25 hrs] Revision problem classes. [8 hrs] pumps. Types of pumps. pumps and their analysis. [25 hrs]		

	Revision problem classes. [7 hrs] head – discharge relations in centrifugal pumps. Effects of blade angle on head – discharge relation in centrifugal pumps. [20 hrs] turbomachines similarity analysis. [20 hrs] compressors analysis. [15 hrs] experimental works in turbomachinery lab. [20 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Giving lectures to explaining the engineering view of turbomachines and the main rules that govern their operating. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	80	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	70	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction – what is the turbomachinery, what is the different between their groups
Week 2	Basics of turbines
Week 3	Impulse turbine 1
Week 4	Impulse turbine 2
Week 5	Reaction turbine 1
Week 6	Reaction turbine 2
Week 7	pumps
Week 8	Centrifugal pumps 1
Week 9	Centrifugal pumps 2

Week 10	Head – discharge relations
Week 11	Effects of blade angle on head – discharge relation, cavitations
Week 12	Compressors 1
Week 13	Compressors 2
Week 14	similarity
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Introduction to turbomachinery
Week 2	Lab 2: pelton wheel 1
Week 3	Lab 3: pelton wheel 2
Week 4	Lab 4: francis turbine 1
Week 5	Lab 5: francis turbine 2
Week 6	Lab 6: centrifugal pump 1
Week 7	Lab 7: centrifugal pump 2

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

Required Texts	Fluid mechanics by streeter	Yes
Recommended Texts	Turbomachinery Fluid mechanics by sengel	No

APPENDIX:

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

Note:

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	MANUFACTURING PROCESSES	**Module Delivery**	
Module Type	CORE	**Theory Lecture Lab Practical Seminar**	
Module Code	ME303		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGx11 3	**Semester of Delivery**	5

Administering Department	ME	**College**	ER
Module Leader	Dr. Adnan A. Ugla	**e-mail**	Adnan-alomary@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	L. Dr. Hamal Sahib M.	**e-mail**	
Review Committee Approval	10/06/2023	**Version Number**	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Principles of Production processes	**Semester**	One
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	37. Introducing the students to the Manufacturing systems. 38. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in mechanical engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 39. Identifying material selection for manufacturing processes. 40. Providing distinguished academic programs in the field of manufacturing processes engineering, both theoretical and practical, to comply with international standards of academic quality and meet the needs of the labor market. 41. Building and developing partnership with the governmental and private sectors and society in all its various institutions.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A. Knowledge and Understanding** 1. Apply the acquired theoretical professional knowledge in manufacturing engineering. 2. Clarify the basic concepts of mechanical manufacturing processes and their applications in industrial fields. 3. Acquiring the skill in dealing with manufacturing problems and solving them through mechanical calculations and mathematical models. 4. Acquisition of basic skills for the manufacture of mechanical parts. 5. Gaining experience in industrial systems and designing according to the calculation of the loads applied during the manufacturing operations. 6. The ability to treat or avoid defects in the product during the manufacturing and production processes. 7. Understand the challenges and drawbacks in the manufacturing processes. Establish the relationship between the material selection and manufacturing processes for different manufacturing parts **B.Subject-specific skills** 1. The ability to design various manufacturing machines through knowledge of the applied loads. 2. The ability to think and address defects that arise during manufacturing processes. 3. Writing scientific reports on manufacturing operations. 4. Choosing and determining the appropriate manufacturing process for each product according to the required specifications and product quality
Indicative Contents المحتويات الإرشادية	Introduction, Definition / manufacturing systems, manufacturing processes, material selection, metal foundry, casting processes, metal removal processes, machining processes, sheet metal forming, metal deformation, joining processes, welding processes, and powder metallurgy
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments

	involving some sampling activities that are interesting to the students

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Manufacturing Processes; definitions, engineering material selection, classification of manufacturing processes.
Week 2	Foundry processes (Casting processes); definitions, calculations of solidification time and pouring time, riser design calculations, shrinkage phenomena, chill types, types of casting processes, pattern types
Week 3	expendable mold casting, sand casting, shell casting, investment casting, evaporative-foam casting, permanent mold casting, low pressure casting, die casting, centrifugal casting, continuous casting, casting quality.
Week 4	Metal forming processes; definitions, stress-strain curve, mechanical material properties, flow stress, average flow stress, stain rate, behavior of materials at elevated temperature.
Week 5	Rolling processes; calculations of force, torque and power at cold and hot rolling, types of rolling machines, types of rolling processes
Week 6	Extrusion processes; calculations of pressure, force and power at cold and hot extrusion, types of extrusion processes, defects of extrusion processes
Week 7	Drawing processes; calculations of stress, force and power at cold drawing, types of drawing machines, nonconventional drawing processes, dieless drawing processes
Week 8	Forging processes; calculations of forging force, types of forging processes, Sheetmetal working processes; sheetmetal cutting, sheetmetal bending, sheetmetal deep drawing
Week 9	Metal removal processes (Machining processes); conventional machining processes; turning processes, milling processes, drilling processes, sawing processes, broaching processes, shaping processes, abrasive processes.
Week 10	Calculations of cutting force and power in conventional machining, calculation of cutting time in conventional machining, optimization of cutting speed in conventional machining, tool geometry, chip formation, time of machining, MRR for cutting processes, stress and strain in chip, tool wear types and tool life
Week 11	Non-conventional machining processes; ultrasonic machining, water jet cutting, electrochemical machining, electrical discharge machining, laser beam machining, electron beam machining, plasma torch cutting, oxyfuel cutting, chemical machining.
Week 12	Joining processes, Welding processes; fusion welding processes, arc welding processes, resistance welding processes
Week 13	Solid-state welding processes, weld quality, design considerations in welding, soldering and brazing processes, mechanical assembly processes

Week 14	Powder metallurgy; powder production, blending and mixing of metal powders, compaction of metal powders, sintering process, secondary and finishing operations and characteristics of P/M
Week 15	Manufacturing systems; manufacturing automation, manufacturing control system
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: fusion welding test
Week 2	Lab 2: solid state welding test
Week 3	Lab 3: turning test
Week 4	Lab 4: Milling test
Week 5	Lab 5: drilling test
Week 6	Lab 6: Grinding test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	FUNDAMENTALS OF MODERN MANUFACTURING: Materials, Processes and Systems, Mikel P. Groover, 4th edition, John Wiley & Sons, Inc, 2010	Yes

Recommended Texts	Kalpakjian S., " Manufacturing Engineering and Technology", Addison-Wesley Publishing, 1989	yes
Websites		

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM نموذج وصف المادة الدراسي ة

Module Information معلومات المادة الدراسية

Module Title	**Design of Machine Systems**	MODULE **Delivery**	
Module Type	CORE	**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	**ME409**		
ECTS Credits	6		
SWL (hr./sem.)	150		
Module Level	**UGIV**	**Semester of Delivery**	8
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Talib EH. Elaikh	**e-mail**	talib-h@utq.edu.iq

Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	M.Sc.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Kazim Kareem	**e-mail**	dkadim2020@utq.edu.iq
Review Committee Approval	/06/2023	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسي ة	1. To understand the use of different types of springs and determine the safe des of springs under given conditions. 2. To determine forces on the transmission shaft and design of the transmission shaft. 3. To determine forces on the power screw and formulate a design solution for t size of the power screw. 4. To understand the standard nomenclature, forces, failures, application, and de procedure of Spur and Helical gears and to determine standard geometry und given loading conditions. 5. To understand the different types of bearings, applications, failures, and desi procedures of Ball Bearings and Sliding contact bearings and to determine standard design procedures of bearing under different loading conditions
Module Learning Outcomes مخرجات التعلم للمادة الدراسي ة	*On successful completion of this module, a student will be expected to be ab to*: 1. Identify different types of loads and stresses. 2. Understand the design of shafts, keys, coupling, gears, belts, pulleys, an power screws. 3. Understand the design of springs and bearings. 4. Analyze stresses on different machine elements. 5. Think creatively about element design. 6. Design the different machine elements from a stress point of view 7. Desi the machine systems

Indicative Contents المحتويات الإرشادي ة	Indicative content includes the following. Part A –Design of transmission components Design of Power Screw [10 hrs.] Spring Design. [15 hrs.] Design of Shafts, Key, and Coupling [15 hrs.] Part B-Design Design of Sliding contact bearing and Rolling contact bearing. [10 hrs. Belt Drive and Gear Design. [20 hrs.] Machine design system. [5 hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعلي م	
Strategies	Type something like: The main strategy for introducing this unit is encouraging students to participate in solving exercises while improvi and extending their critical thinking skills. This will be achieved throu the chapters and the preparation of reports on topics related to the co issue of machine design.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفص ل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفص ل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفص ل	147+3 hrs. (Final exam) =150 hrs.		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learnin Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 1
	Assignments	1	5% (10)	2, 12	LO # 3, 4, 5 and 6
	Report	1	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr.	20% (10)	7	LO # 1-7
	Final Exam	3 hr.	60% (60)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظر ي	
	Material Covered
Week 1	Design of Power Screw
Week 2	Design of Power Screw
Week 3	Spring Design
Week 4	Spring Design
Week 5	Shafts, Key, Coupling
Week 6	Shafts, Key, Coupling
Week 7	Mid-term Exam
Week 8	Sliding contact bearing
Week 9	Rolling contact bearing
Week 10	Belt Drive
Week 11	Belt Drive
Week 12	Gear Design
Week 13	Gear Design
Week 14	Machine design system
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدري س		
	Text	**Available in the Library?**
Required Texts	Machin Design, R.S. KHURMI and J.K. GUPTA, EURASIA PUBLISHING HOUSE (PVT.) LTD.	Yes
Recommended Texts	Design of Machine Elements by V B Bhandari, McGraw Hill Education Private Limited.	Yes

Websites	

APPENDIX:

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

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example, a mark of 5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to cond "near-pass fails," so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTOR FORM نموذج وصف المادة الدراسي ة

Module Information معلومات المادة الدراسية

Module Title	**Machine Design**		MODULE **Delivery**	
Module Type	CORE		**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	**ME404**			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	1	**UGIV**	**Semester of Delivery**	7
Administering Department		Type Dept. Code	**College**	Type College Code
Module Leader	Talib EH. Elaikh		**e-mail**	talib-h@utq.edu.iq
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**	M.Sc.
Module Tutor	None		**e-mail**	None
Peer Reviewer Name		Dr. Kazim Kareem	**e-mail**	dkadim2020@utq.edu.iq
Review Committee Approval		/06/2023	**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخر ى

Prerequisite module	Strength of material	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسي ة	1. To understand the machine design procedure and develop an ability apply it for simple component design. 2. To understand the different theories of failure and develop an ability apply its knowledge for the design of the mechanical component an determine the resisting areas against failure 3. To determine the endurance strength and design of components subje to fluctuating loads 4. To determine the forces in weld joints and formulate a design solution the weld size. 5. To determine forces on the bolted joints and formulate a design solut for the bolt size. 6. To understand the type of pressure vessel, pipe, and pipe Joints as well a determine the different stresses applied and dimensions of the pressure ves and pipe
Module Learning Outcomes مخرجات التعلم للمادة الدراسي ة	On successful completion of this module, a student will be expected to able to: 1. Be able to apply knowledge of the stress and strain of mechanical components; and understand, identify, and quantify factors of safety a failure modes for simple mechanical components subjected to direct a bending and combined loading. Acquire the skill and logic of finding resisting areas against failure and simple component design. 2. Develop the analytical ability to apply Knowledge of various theories failures for the design of Mechanical components used in Industries li Joints, Bolts, Shafts, etc., and understand and develop the analytical ability to design shafts subjected to combined loading. 3. Understanding the mechanism of fatigue failures of parts and their use mechanical component design. Be able to estimate the endurance strength of ductile and brittle materials and develop the analytical abil to apply fatigue theories for ductile and brittle material in static and dynamic loading 4. Understand different welded joint structures an able to apply their knowledge to analyze their strength when subjecte to simple, coplanar, and eccentric loading. 5. Understand different stress in pressure vessels, pipes, and bolted Joi and be able to apply its knowledge for the design of pressure vessels a bolted joints.

Indicative Contents المحتويات الإرشادي ة	Indicative content includes the following. Part A – Introduction Introduction to machine design, Review of stress and strain, The factor safety, and design codes [10 hrs.] Torsional and Bending Stresses in Straight and Curved Beams. [15 hrs Static Failure Theories, Fatigue, and Variable Stresses [15 hrs.] Part B-Design Design of welded joint. [10 hrs.] Screws and Fasteners. [10 hrs.] Pressure vessels. [10 hrs.] Pipe and pipe joints. [5 hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعلي م	
Strategies	Type something like: The main strategy for introducing this unit is encouraging students to participate in solving exercises while improv and extending their critical thinking skills. This will be achieved throu the chapters and the preparation of reports on topics related to the c issue of machine design.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem.) الحمل الدراسي المنتظم للطالب خلال الفص ل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفص ل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفص ل	147+3 hrs. (final exam) = 150 Hrs.		

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, 3,4, 10 and
	Assignments	1	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	5% (10)	13	LO # 5, 9 and 10
Summative assessment	Midterm Exam	2 hr.	20% (10)	8	LO # 1-7
	Final Exam	3 hr.	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظر ي

	Material Covered
Week 1	Introduction to machine design, Design Methodology, Synthesis, and Material Selectio
Week 2	Review of stress and strain, The factor of safety, and design codes
Week 3	Torsional and Bending Stresses in Straight and Curved Beams
Week 4	Torsional and Bending Stresses in Straight and Curved Beams
Week 5	Static Failure Theories
Week 6	Fatigue and Variable Stresses
Week 7	Fatigue and Variable Stresses
Week 8	Mid-term Exam
Week 9	Design of welded joint
Week 10	Design of welded joint
Week 11	Screws and Fasteners
Week 12	Screws and Fasteners
Week 13	Pressure vessels
Week 14	Pipe and pipe joints

Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدري س

	Text	Available in the Library?
Required Texts	Machin Design, R.S. KHURMI and J.K. GUPTA, EURASIA PUBLISHING HOUSE (PVT.) LTD.	Yes
Recommended Texts	Design of Machine Elements by V B Bhandari, McGraw Hill Education Private Limited.	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجا ت

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

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

MODULE DESCRIPTOR FORM نموذج وصف المادة الدراسي ة

Module Information معلومات المادة الدراسية

Module Title	THEORY OF MACHINE	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME306		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level 1	3	**Semester of Delivery**	1
Administering Department	ME	**College**	ER

Module Leader	Prof. Dr. Haider J. Abid	**e-mail**	Haider-jabaur-abid@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخر ى			
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 الدراسي ة	By the end of this course, you will be able to understand: - 1. Fundamentals of Mechanisms and Machines 2. Velocity and Accelerator in Mechanism 3. Cams, Followers, Power Transmission, Flywheels, Governors, Brake Dynamometers and Clutches.
Module Learning Outcomes مخرجات التعلم للمادة الدراسي ة	1. Recognize how determining the displacement, velocity and acceleratio 2. List the various terms associated with theory of Machine. 3. Summarize what is meant by a basic of theory of machines. 4. Describe displacement, velocity and accelerations. 5. Identify the basic mechanical analysis of machine elements. 6. Discuss the types of Mechanical Governors. 7. Discuss the various types of Gears 8. Explain the motions of follower cams. 9. Identify the analysis of Brakes System. 10. Explain the types of vibrations.

Indicative Contents المحتويات الإرشادي ة	Indicative content includes the following. Part A – Theory of Machines Part I Introduction, Velocity in mechanism (Instantaneous Center Method) [1 hrs] Velocity in mechanism (Relative Velocity Method), [15 hrs] Acceleration in mechanism, [10 hrs] Balancing of Rotating masses, [15 hrs] Balancing of reciprocating masses, [6 hrs] Friction clutches [15 hrs] Part B - Theory of Machines Part II Friction clutches [15 hrs] Belts, ropes and chain drives. [7 hrs] Toothed gearing, Gear trains, Gyroscopic couple and processional motio Turning moment diagrams and flywheel, Governors, Cams, Universal joi (Hooks) [15 hrs]
Learning and Teaching Strategies استر اتيجيات التعلم و التعلي م	
Strategies	Type something like: The main strategy that will be adopted in deliverin this module is to encourage students' participation in the exercises, wh at the same time refining and expanding their critical thinking skills. T will be achieved through classes, interactive tutorials and by consideri type of simple experiments involving some sampling activities that ar interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفص ل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفص ل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفص ل	100		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظر ي

	Material Covered
Week 1	Introduction, Velocity in mechanism (Instantaneous Center Method)
Week 2	Velocity in mechanism (Relative Velocity Method),
Week 3	Acceleration in mechanism,
Week 4	Balancing of Rotating masses
Week 5	Balancing of reciprocating masses
Week 6	Friction clutches
Week 7	Belts, ropes and chain drives
Week 8	Toothed gearing, Gear trains,
Week 9	Gyroscopic couple and processional motion,
Week 10	Gyroscopic couple and processional motion,
Week 11	Turning moment diagrams and flywheel,
Week 12	Governors,
Week 13	Cams
Week 14	Universal joint
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

Learning and Teaching Resources

مصادر التعلم والتدري س

	Text	**Available in th Library?**
Required Texts	Khurmi, R. S., and J. K. Gupta. *Theory of machines*. S. Chand Publishing, 2005.	Yes
Recommended Texts	*Prince, O. M. (2008). Theory of Machines-II (M504) A.*	No
Websites		

APPENDIX:

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

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

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to cond "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية				
Module Title	FUNDAMENTALS OF INTERNAL COMBUSTION ENGINES		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME304			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGx11 3	**Semester of Delivery**	5	
Administering Department		**College**		
Module Leader	Dr. Ahmed A. Ouda	**e-mail**	Ouda1978@utq.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name	Assist Prof. Dr. Ahmad J. Sh.	**e-mail**	shakarah@utq.edu.iq	
Review Committee Approval	11/06/2023	**Version Number**	1.0	

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ER105 and ME202	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The main objectives of the course are to: 42. Provide students with easy-to-understand analyses of basic combustion concepts. 43. Give an introduction of a wide variety of practical applications that motivate or relate to the various theoretical concepts of combustion. 44. Provide students with an introduction to Internal Combustion (IC) engines.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completion of the course students are expected to: 71. Describe main concepts within combustion theory. 72. Understand the main characteristics of combustion chemistry, kinetics, and mechanisms 73. Describe the main components of Internal Combustion engines. 74. Apply engineering fundamentals to the analysis of IC engines.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. History of engines and modern developments, challenges facing internal combustion engines. Overview of Combustion Combustion and Thermochemistry Chemical Kinetics and Mechanisms Thermal Analyses of Reacting Systems Combustion and Flows o Simplified Conservation Equations for Reacting Flows o Laminar Premixed and Diffusion Flames Introduction to Turbulent Flows Turbulent Premixed and Nonpremixed Flames
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, in-class examples and exercises, in-class activities, designing, videos. The course format is 3 h lectures and 1 h design tutorial session per week..

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**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

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)		
	Homeworks	5	10% (10)		
	Projects / Lab.	2	10% (10)		
	Report				
Summative assessment	Midterm Exam	2 hr	20% (10)		
	Final Exam	2hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	History of engines and modern developments,
Week 2	challenges facing internal combustion engines.
Week 3	Overview of Combustion
Week 4	Combustion and Thermochemistry
Week 5	Combustion and Thermochemistry
Week 6	Chemical Kinetics and Mechanisms
Week 7	Chemical Kinetics and Mechanisms
Week 8	Thermal Analyses of Reacting Systems

Week 9	Thermal Analyses of Reacting Systems
Week 10	Combustion and Flows
Week 11	Combustion and Flows
Week 12	Simplified Conservation Equations for Reacting Flows
Week 13	Laminar Premixed and Diffusion Flames
Week 14	Introduction to Turbulent Flows
Week 15	Turbulent Premixed and Nonpremixed Flames
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Study of cut model of IC Engine (4- stroke petrol and diesel engine)
Week 2	Study of cut model of IC Engine (4- stroke petrol and diesel engine)
Week 3	Study of cut model of IC Engine (2-stroke petrol and diesel engine)
Week 4	Study of cut model of IC Engine (2-stroke petrol and diesel engine)
Week 5	Study of valve timing diagram of petrol engine.
Week 6	Study of valve timing diagram of petrol engine.
Week 7	Study of valve timing diagram of petrol engine.
Week 8	Study of valve timing diagram of diesel engine.
Week 9	Study of valve timing diagram of diesel engine.
Week 10	Study of valve timing diagram of diesel engine.
Week 11	Determine of flash point and fire point of sample oil.

Week 12	Determine of flash point and fire point of sample oil.
Week 13	Determine of flash point and fire point of sample oil.
Week 14	Determine of calorific ofa fuel by bomb calorimeter.
Week 15	Determine of calorific ofa fuel by bomb calorimeter.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. John B. Heywood, Internal Combustion Fundamentals, McGRAW-HILL, Automotive Technology Series, ISBN 0-07-100499-8, 1988 2. R. Ferguson, A.-T. Kirkpatrick, Internal Combustion Engines, 3rd Edition, WILEY, ISBN 978-1-118-53331-4, 2015	Yes
Recommended Texts		No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering	

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	DESIGN OF INTERNAL COMBUSTION ENGINES			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME312				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGx11 3		**Semester of Delivery**	6	
Administering Department			**College**		
Module Leader	Dr. Ahmed A. Ouda		**e-mail**	Ouda1978@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Assist Prof. Dr. Ahmad J. Sh.		**e-mail**	shakarah@utq.edu.iq	
Review Committee Approval	11/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ME304	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents			

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main objectives of the course are to: 45. Present components and technologies used in IC engines. 46. Students will gain an understanding of the fundamentals the design and operation of internal combustion and the factors governing engine design decisions affecting their performance & efficiency, fuelling strategies and environmental impact. 47. Students will become knowledgeable in fluid flow, thermodynamics, combustion, heat transfer and friction phenomena and fuel properties relevant to engine power efficiency & emissions..
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completion of the course students are expected to: 75. Demonstrate an understanding of the current engine technology and future trends. 76. Perform analysis of internal combustion engine thermodynamic cycles. 77. Determine basic engine performance parameters. 78. Evaluate the influence of different design parameters and different technologies on engine performance. 79. Be aware of issues relating to energy conversion and pollutant emissions in IC engines.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Burning Burning of Solids Droplet Evaporation and Burning Engine types and configurations. Review of fuel chemistry, emissions, engine performance metrics & characteristics Spark Ignition (SI) engines, operating principle, standard cycles, combustion in SI engines, emissions and emission control. Induction, exhaust processes, and heat transfer in ICE; Compression ignition engines, combustion in diesel engines, diesel engine emissions and emission control. Turbo/supercharging. Alternative engine cycles. Alternative fuels.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

Strategies	Lectures, in-class examples and exercises, in-class activities, designing, videos. The course format is 3 h lectures and 1 h design tutorial session per week..

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**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

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)		
	Homeworks	5	10% (10)		
	Projects / Lab.	2	10% (10)		
	Report				
Summative assessment	**Midterm Exam**	2 hr	20% (10)		
	Final Exam	2hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Burning
Week 2	Burning of Solids
Week 3	Droplet Evaporation and Burning
Week 4	Engine types and configurations.
Week 5	Review of fuel chemistry
Week 6	Emissions
Week 7	engine performance metrics & characteristics
Week 8	Spark Ignition (SI) engines
Week 9	operating principle, standard cycles
Week 10	combustion in SI engines
Week 11	emissions and emission control.
Week 12	Induction, exhaust processes, and heat transfer in ICE;
Week 13	Compression ignition engines,
Week 14	combustion in diesel engines,
Week 15	diesel engine emissions and emission control.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Performance test of an IC Engine using mechanical rope break dynamometer.

Week 2	Performance test of an IC Engine using mechanical rope break dynamometer.
Week 3	Performance test of an IC Engine using mechanical rope break dynamometer.
Week 4	Performance test of an IC Engine using electrical break dynamometer.
Week 5	Performance test of an IC Engine using electrical break dynamometer.
Week 6	Performance test of an IC Engine using electrical break dynamometer.
Week 7	Performance test of an IC Engine using electrical break dynamometer.
Week 8	Performance test of a multi cylinder petrol engine by Morse method.
Week 9	Performance test of a multi cylinder petrol engine by Morse method.
Week 10	Performance test of a multi cylinder petrol engine by Morse method.
Week 11	Performance test of a multi cylinder petrol engine by Morse method.

Learning and Teaching Resources

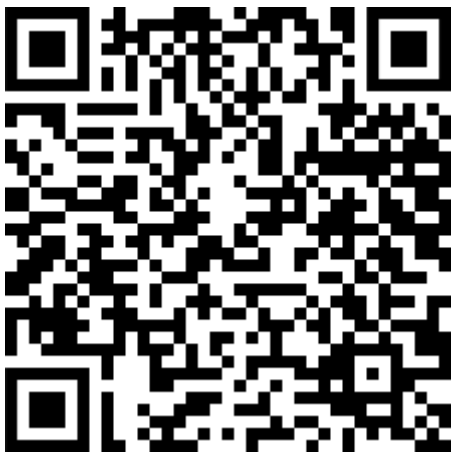
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. John B. Heywood, Internal Combustion Fundamentals, McGRAW-HILL, Automotive Technology Series, ISBN 0-07-100499-8, 1988 2. R. Ferguson, A.-T. Kirkpatrick, Internal Combustion Engines, 3rd Edition, WILEY, ISBN 978-1-118-53331-4, 2015	Yes
Recommended Texts		No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering	

APPENDIX:

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

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



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

MODULE DESCRIPTOR FORM نموذج وصف المادة الدراسية

Module Information معهمات انمادة انذراسيت					
Module Title	CONTROL AND MEASUREMENTS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME411				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1	UGIV	**Semester of Delivery**		8
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Kadim Karim Mohsin		**e-mail**	dkadim2020@utq.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name		Talib EH. Elaikh	**e-mail**	talib-h@utq.edu.iq	
Review Committee Approval		/06/2023	**Version Number**		1.0

Relation With Other Modules انعلاقت مع انمـاد انذراسيت الأخري

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

Module Aims, Learning Outcomes and Indicative Contents أهذاف انمادة انذراسيت ونتائج انتعهم وانمحتيات الإرشاديت	
Module Aims أهذاف انمادة انذراسيت	1. To develop problem solving skills and understanding of transfe function concepts through the application of techniques. 2. To find the mathematical relationship (transformation function) t links the output / input of the system in the time domain and transform to Laplace domain 3. To get the control property of the system. 4. To understand how to reduce the transfer Function Can be by Blo diagram method or Mason's Rule methods. 5. To understand Signal Flow Graph,. 6. To understand System, Stability, Frequency Response analysis 7. Lead-Lag Compensation
Module Learning Outcomes مخرجاث انتعهم نهمادة انذراسيت	1. Learner should be able to Identify and select proper measuring instrument for specific application Illustrate working principle measuring instruments. 2. Explain calibration methodology and error analysis related to measur instruments 3. To get the control property of the system. 4. Mathematically model and analyze..

Indicative Contents انمحتيات الإرشاديت	Indicative content includes the following. (60 hr) Part A - Transfer Function Concepts Transfer Function Concepts[5 hrs] Laplace Transformations, Matrices [5 hrs] Signal Flow Graph (S.F.G) l analysis. [10 hrs] Bode plot [5 hrs] Part B - Stability criteria Routh-Herwitz, method , [4 hrs] Bode plot, Nichols method. [6 hrs] Nyquist method [5 hrs] Frequency Response[5 hrs] Compensation [5 hrs] Controllers, Measurement Devices[10 hrs]
Learning and Teaching Strategies استراتيجيات انتعهم وانتعهيم	
Strategies	Type something like: The main strategy that will be adopted in deliverin this module is to encourage students' participation in the exercises, wh at the same time refining and expanding their critical thinking skills. Th will be achieved through classes, interactive tutorials and by consideri type of simple experiments involving some sampling activities that ar interesting to the students.

Student Workload (SWL) انحمم انذراسي نهطانب			
Structured SWL (h/sem) انحمم انذراسي انمنتظم نهطانب خلال انفصم	64	**Structured SWL (h/w)** انحمم انذراسي انمنتظم نهطانب أسبعيا	4
Unstructured SWL (h/sem) انحمم انذراسي غير انمنتظم نهطانب خلال انفصم	36	**Unstructured SWL (h/w)** انحمم انذراسي غير انمنتظم نهطانب أسبعيا	2.67
Total SWL (h/sem) انحمم انذراسي انكهي نهطانب خلال انفصم	100		

Module Evaluation
تقييم انمادة انذراسيت

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

Delivery Plan (Weekly Syllabus)
انمنهاج الاسبعي اننظري

	Material Covered
Week 1	Laplace Transformations
Week 2	Matrices
Week 3	Transfer Function Concepts
Week 4	Transfer Function
Week 5	Signal Flow Graph (S.F.G)
Week 6	System Analysis
Week 7	Stability
Week 8	**Mid Exam**
Week 9	Stability
Week 10	Frequency Response
Week 11	Compensation
Week 12	Lead-Lag Compensation
Week 13	Controllers
Week 14	Solved Exams
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) انمنهاج الاسبعي نهمختبر	
	Material Covered
Week 1	Lab 1: Controllers, Control Systems
Week 2	Lab 2: Measurement Devices
Week 3	Lab 3: Introduction to simulik
Week 4	Lab 4: Example abut simulink and blocks diagram
Week 5	Lab 5: Step response using matlab
Week 6	Lab 6: Examples about step response
Week 7	Lab 7:.Block diagram reduction using matlab
Week 8	Lab 8: Series connections with examples
Week 9	Lab 9: Parallel connections with examples
Week 10	Lab 10: Feedback connections with example
Week 11	Lab 11: State space representation using matlab
Week 12	Lab 12: Time response of first order

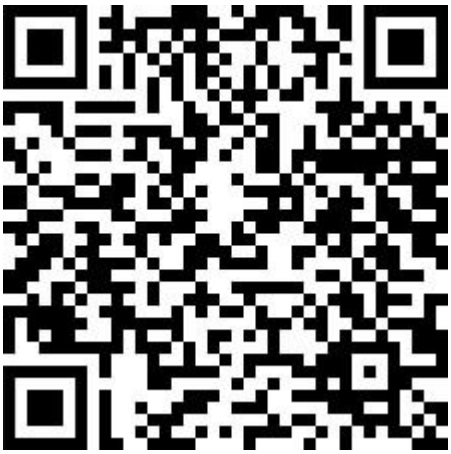
Learning and Teaching Resources مصادر انتعهم وانتذريس		
	Text	**Available in the Library?**
Required Texts	1. MEASUREMENT. SYSTEMS. Application and Design. Fourth Edition. Ernest O. Doebelin. 2. Experimental Methods for Engineers / Holman/ McGraw-Hill Education	Yes
Recommended Texts	1. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers. 2. Instrumentation and Mechanical Measurements / A.K. Tayal / Galgotia Publications.	Yes
Websites	https://journals.sagepub.com/home/mac	

APPENDIX:

GRADING SCHEME مخطط انذرجاث				
Group	**Grade**	انتقذير	**Marks (%)**	**Definition**
	A - Excellent	امتياز	90 - 100	Outstanding Performance

Success Group (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	متسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبل	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبل بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work require
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to cond "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.



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

MODULE DESCRIPTOR FORM نموذج وصف المادة الدراسية

Module Information معهمات انمادة انذراسيت

Module Title	MECHANICAL VIBRATIONS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	ME401				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1	UGIV	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Kadim Karim Mohsin		**e-mail**	dkadim2020@utq.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name		Talib EH. Elaikh	**e-mail**	talib-h@utq.edu.iq	
Review Committee Approval		/06/2023	**Version Number**		1.0

Relation With Other Modules
انعلاقت مع انمـاد انذراسيت الأخري

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

Module Aims, Learning Outcomes and Indicative Contents أهذاف انمادة انذراسيت ونتائج انتعهم وانمحتياث الإرشاديت

Module Aims أهذاف انمادة انذراسيت	1. To develop problem solving skills and understanding of Mechanic 2. Vibrations theory through the application of techniques. To understand Newton's law of motion, the energy method, Lagrange's equations. 3. This course deals with the fundamentals, discussions and proble extending into many phases and applications of mechanical vibrations. 4. This is the basic subject for all primarily supplement standard te in elementary of Mechanical Vibrations subject.

	5. To understand numerous proofs of theorems and derivations o basic results are included among the solved problems. 6. To perform Vibrations problems analysis.
Module Learning Outcomes مخرجاث انتعهم نهمادة انذراسيت	1. Recognize the fundamental single-degree-of-freedom systems a the complex multiple-degree-of-freedom systems. 2. 3. 4. List the various terms associated with Vibrations systems. Summarize what is meant by basic Vibrations. 5. 6. 7. Discuss the reaction and involvement of Newton's law of motion, the energy method, and Lagrange's equations. Describe 8. influence coefficients, matrix iteration, Define the Holzer method, the Stodola method.. Identify the mechanical impedance method and mechanical impedance method applications. Discuss the operations of sinusoid and phases in Vibrations syste 9. Discuss the various properties of transverse vibration of uniform bear and circular shafts 10. Explain the nonlinear and self-excited vibration analysis. 11. Identify the Modal Analysis 12. Coordinates Coupling and Principal Coordinates 13. Vibration of Continuous media 14. Finite Element Vibration Analysis
Indicative Contents انمحتنياث الإرشاديت	Indicative content includes the following. (60 hr) <u>Part A - vibrations Theory</u> Basic Concepts of Vibration – Mechanical vibration systems

	Vibration measurement terminology (some useful quantities) Types of vibration Free vibration Forced vibrations Damping Seismic instruments Degrees of Freedom of the system (D.O.F.). [5 hrs] Single Degree of Freedom Undamped Free Vibration Systems Free body diagram: Static case, free body diagram, Dynamic equilibrium Free bo diagram, Dynamic case Comparison between translational and rotation system, Single Degree of Freedom Damped Free Vibration Systems, Sin Degree of Freedom Undamped Forced Vibration Systems. [10 hrs] Harmonically Excited Vibration equation of motion of SDOF damped forc vibration systems, Rotating (Imbalance) unbalance Seismographs measures earthquake vibration, Torsi graph, Whirling of rotating shaft [5 hrs] Time to Frequency Domain Conversion: Fourier Series, Lagrange's Equation of Motion, Multi-Degrees of Freedom System (MDOFS) ,Modal Analysis, Definite and Semi-Definite Systems (Degenerate System) [5 hrs] Coordinates Coupling and Principal Coordinates [5 hrs] Part B - Multi (Several) Degree of Freedom Systems , Dynamic Vibration Absorber, Orthogonality Principle Influence coefficien [10 hrs] Torsional Vibration. [5 hrs] Approximation Methods, Vibration of Continuous media, Finite Elemen Vibration Analysis. [15 hrs]
Learning and Teaching Strategies استراتيجيات انتعهم وانتعهيم	
Strategies	Type something like: The main strategy that will be adopted in deliverin this module is to encourage students' participation in the exercises, wh at the same time refining and expanding their critical thinking skills. Th will be achieved through classes, interactive tutorials and by consideri type of simple experiments involving some sampling activities that ar interesting to the students.

Student Workload (SWL) انحمم انذراسي نهطانب			
Structured SWL (h/sem) انحمم انذراسي انمنتظم نهطانب خلال انفصم	63	**Structured SWL (h/w)** انحمم انذراسي انمنتظم نهطانب أسبىعيا	4
Unstructured SWL (h/sem) انحمم انذراسي غير انمنتظم نهطانب خلال انفصم	62	**Unstructured SWL (h/w)** انحمم انذراسي غير انمنتظم نهطانب أسبىعيا	4.13
Total SWL (h/sem) انحمم انذراسي انكهي نهطانب خلال انفصم	125		

Module Evaluation
تقييم انمادة انذراسيت

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 1
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
انمنهاج الاسبىعي انىظري

	Material Covered
Week 1	Basic Concepts of Vibration
Week 2	Single Degree of Freedom Undamped , Damped Free Vibration Systems
Week 3	Single Degree of Freedom Undamped Forced Vibration Systems
Week 4	Harmonically Excited Vibration
Week 5	Time to Frequency Domain Conversion: Fourier Series
Week 6	Lagrange's Equation of Motion
Week 7	Multi-Degrees of Freedom System (MDOFS),Definite and Semi-Definite Systems (Degenerate System)
Week 8	**Mid Exam**

Week 9	Two DOF Free Vibrations with Damping
Week 10	Two DOF UnDamped and Damped Forced Vibration
Week 11	Dynamic Vibration Absorber, Orthonormality condition and Normalization Method /
	Orthogonality Principle
Week 12	Influence coefficients, Torsional Vibration
Week 13	Approximation Methods
Week 14	Vibration of Continuous media
Week 15	Finite Element Vibration Analysis
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) انمنهاج الاسبعي نهمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر انتعهم وانتذريس		
	Text	**Available in the Library?**

Required Texts	William T.Thomson ,Vibration Theory and Application William W. Seto , Schaum's outline of theory and problems of Mech. vibrations Kadim Karim Mohsen Ali ALTursha,Mechanical Vibrations	Yes
Recommended Texts	S. S. Rao, Mechanical Vibrations. S. Graham Kelly Schaum's Outline of Mechanical Vibrations	Yes
Websites	https://books.google.iq/books/about/TEXTBOOK_OF_MECHANICAL_VIBRATIO .html?id=JQkDEYvAGDAC&redir_esc=y	

APPENDIX:

GRADING SCHEME مخطط انذرجاث				
Group	**Grade**	انتقذير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيذ جذا	80 - 89	Above average with some errors
	C - Good	جيذ	70 - 79	Sound work with notable errors
	D - Satisfactory	متسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبل	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبل بقرار	(45-49)	More work required but credit awarde
	F – Fail	راسب	(0-44)	Considerable amount of work requir
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to cond "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	REFRIGERATION	**Module Delivery**
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical**
Module Code	ME408	
ECTS Credits	5	
SWL (hr/sem)	125	

		Seminar	
Module Level	UGx11 4	**Semester of Delivery**	7
Administering Department	Mechanical	**College**	Engineering
Module Leader	Prof. Dr. Mushtaq I. Hasan	**e-mail**	mushtaq@utq.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Ahmad shkarah	**e-mail**	@uobaghdad.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	48. Teaching students the principles of fan work and fan calculations. 49. Teaching students the principles of piping systems. 50. Teaching students how to design piping system. 51. Teaching students the principles of refrigeration. 52. Teaching students the required calculations of refrigeration system and designing the refrigeration system of different types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	80. Identify the basics of fans, pumps, piping and piping system. 81. The student will be familiar with fan and pump selection. 82. Ability to design piping system. 83. The student will be familiar with different refrigeration systems. 84. The student will be able to design the refrigeration systems of different types.

Indicative Contents المحتويات الإرشادية	Fans Design of piping system Introduction to refrigeration Carnot engine & ravines Carnot cycle Ideal & actual vapors compression refrigeration cycle Ideal &actual vapors compression refrigeration cycle Compound vapors compression refrigeration cycle refrigerants refrigeration system components Absorption refrigeration system
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning strategy will be focus on teaching the students the main principles of subject and make them familiar with it and able to analysis and design the air conditioning and ducting systems of different types. The strategy also includes present applications and applied examples to make students in contact with real applications of subject.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Fans
Week 2	Piping systems
Week 3	Design of piping system
Week 4	Introduction to refrigeration
Week 5	Carnot engine
Week 6	Revers Carnot cycle
Week 7	Ideal & actual vapors compression refrigeration cycle
Week 8	Ideal &actual vapors compression refrigeration cycle
Week 9	Compound vapors compression refrigeration cycle

Week 10	refrigerants
Week 11	refrigeration system components
Week 12	refrigeration system components
Week 13	**Absorption refrigeration system**
Week 14	**Absorption refrigeration system**
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Refrigeration cycle
Week 2	Lab 2: refrigeration cycle components
Week 3	Lab 3: vehicle air conditioning system
Week 4	Lab 4: absorption refrigeration cycle
Week 5	
Week 6	
Week 7	

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

Required Texts	Dr. Fundamentals of Air conditioning and refrigeration Al-Qadisiya 1st Abbas A. S. Al - Jeebori 2006 university	Yes
Recommended Texts	مبادئ هندسه تكييف الهواء والتثليج الدكتر خالد احمد الجودي كليه الهندسه – جامعه البصره 1986	yes
Websites	https://www.youtube.com/channel/UCu9Puth4dyEiUC6tsIG4P1w/videos	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

Note:

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	AIR CONDITIONING			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ME402				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGx11 4		**Semester of Delivery**	7	
Administering Department	Mechanical		**College**	Engineering	
Module Leader	Prof. Dr. Mushtaq I. Hasan		**e-mail**	mushtaq@utq.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr. Ahmad shkarah		**e-mail**	@uobaghdad.edu.iq	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation with Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	53. Teaching students the principles of air conditioning. 54. Teaching students how to design cooling and heating systems and how to calculate thermal loads. 55. Teaching students the principles of ducting systems. 56. Teaching students the duct design methods.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	85. Identify the basics of air conditioning. 86. The student will be familiar with comfort conditions and how human body react with heat and environment. 87. Ability to calculate cooling and heating loads. 88. Ability to design air conditioning systems. 89. The student will be familiar with ducting systems. 90. The student will be able to design the duct systems.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to AC & measuring unit Properties of moist air Humidity calculations & Dalton's law Humidity calculations & Dalton's law Psychrometric chart & Psychrometric process Air mixing		

	Heat transfer principles Overall heat transfer coefficient & wall surface temperature Comfort conditions Comfort conditions Cooling load calculation Cooling load calculation Cooling load calculation Cooling load calculation Heating load calculations Heating load calculations Fluid flow through ducts and air distribution Fluid flow through ducts and air distribution Duct design (pressure drop method, velocity method, static regain method) Duct design (pressure drop method, velocity method, static regain method)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The learning strategy will be focus on teaching the students the main principles of subject and make them familiar with it and able to analysis and design the air conditioning and ducting systems of different types. The strategy also includes present applications and applied examples to make students in contact with real applications of subject.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**Introduction to AC & measuring unit**
Week 2	**Properties of moist air**
Week 3	**Humidity calculations & Dalton's law**
Week 4	**Humidity calculations & Dalton's law**
Week 5	**Psychrometric chart & Psychrometric process**

Week 6	**Air mixing**
Week 7	**Heat transfer princeples**
Week 8	**Comfort conditions**
Week 9	**Cooling load calculation**
Week 10	**Cooling load calculation**
Week 11	**Heating load calculations**
Week 12	**Fluid flow through ducts and air distribution**
Week 13	**Duct design(pressure drop method, velocity method, static regain method)**
Week 14	**Duct design (pressure drop method, velocity method, static regain method)**
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Psychrometric process (process 1 + process2)
Week 2	Lab 2: Psychrometric process (process 3 + process4)
Week 3	Lab 3: Humidity calculations
Week 4	Lab 4: Humidity calculations
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Dr. Fundamentals of Air conditioning and refrigeration Al-Qadisiya 1st Abbas A. S. Al - Jeebori 2006 university	Yes
Recommended Texts	مبادئ هندسه تكييف الهواء والتثليج الدكتر خالد احمد الجودي كليه الهندسه – جامعه البصره 1986	yes
Websites	https://www.youtube.com/channel/UCu9Puth4dyEiUC6tsIG4P1w/videos	

APPENDIX:

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

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to

condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Industrial Engineering and quality control**		**Module Delivery**	
Module Type	CORE		**Theory**	
Module Code	**ME405**		**Lecture**	
ECTS Credits	4		**Practical**	
SWL (hr/sem)	100		**Seminar**	
Module Level	UGx11 1	**Semester of Delivery**	1	
Administering Department	Type Dept. Code	**College**	Type College Code	

Module Leader	Dr. Mustafa M. Mansor	**e-mail**	Mustafa.muhammedali @utq.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

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	Acquisition of interdisciplinary knowledge Institutional knowledge about economic and legal systems Knowledge about international organisations Media, technology and innovation, in addition to the abilty to apply the breadth and depth of this subject including the basic terminology, concepts, principles and theories of it in order to: • Understand the different types of information systems. • Be able to: design, develop, and analyze industrial information systems. • Be able to develope information systems by using microcomputers. • Identify ethical implications of Information Systems. • Able to solve homework and design projects in a team environment
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply knowledge of mathematics, science, and engineering. 2. Understand professional and ethical responsibility. 3. Communicate effectively. 4. Understand the impact of engineering solutions in a global and societal context. 5. Recognize the need to engage in life-long learning. 6. Gain knowledge of contemporary issues. 7. Use the techniques, skills, and modern engineering tools necessary for engineering practic
Indicative Contents	

المحتويات الإرشادية	Indicative content includes the following. The first Concepts and objectives of industrial engineering. Introducing the concept of industrial engineering as a branch of engineering management and its objectives. Page 7-1 the second :Technical and economic feasibility studies include studying production costs (variable and fixed) and using the project profitability percentage Page 12-8 Industrial projects :The size and value of the break-even point, the percentage of the safety limit, and the project's amortization (recovery) period for the invested capital. production costs: Break-even point analysis and the relationship between cost, profit and production volume. Page 16-12 Productivity:Types of productivity and methods of measuring them (conversion factor method and cash method) and methods of increasing it. Page 20-17 work study :The benefits of studying the work and its main steps, measuring the content of the work and determining the standard time. Page 25-21 industrial: The administrative and technological organization of the establishment, the types of organizations, the corresponding administrative levels, the technological organization, its types, and the production cycle.Page 36-29 Students in the first chapter (semesters one, two and three) with a test. Discussion Reports 46-38 :The use of operations research in production / basic requirements for linear programming and its description (general, legal and standard) and how to conver Between them and how to formulate the model mathematically and solve the model mathematically. Linear programming: Solve the mathematical model using Simplex, M-technique and phase -2 methods Page 52-47 58-56

	Define the problem as a special case of linear programming paradigms and how to find the initial solution using Transfer problem model:The northwest corner's least expensive methods are VAM and RAM. Testing and improving the first solution in one of two ways: Stepping stone or Multipliers to reach the optimal solution Page 67-59 Allocation problem: Definition of the problem as a special case of linear programming paradigms and how to find the optimal solution in my case. Page 74-68 Maximizing profit or revenue or reducing cost or time. Definition of network diagrams and how to draw them and find the critical path.P. The critical time and method of program evaluation and review (PERT). Page 81-75 Speeding up and slowing down network diagrams (finding the lowest possible time and cost for project implementation). Page 88-81 94-89 relay models: Definition of sequence models and completion of tasks on a single machine, finding the shortest running time.S.P.T As well as the longest running time ...L, and the completion of tasks on two machines, and the completion of tasks on three machines. Completion of tasks on 11 machines, and completion of tasks on two machines in a same workshop Page 99-94 Different technological paths (Random flow).

	ideal substitution: Studying the operating and maintenance costs to find the time to replace the machine with a study of the individual cost rate Replacement of idle units and the collective cost rate to replace all units to determine the policy Maintenance model with a solution to the separation exercises. Page 108-104 Total Quality Management TOM and ISO:Quality and total quality management (its initial foundations and principles). Page 114-110 Total quality management (its elements, stages of application and benefits). Page 117-115 The concept of ISO 9000 (its specifications, the method of performing technical work and its principles). Page 121-117 The concept of ISO 9000 (its benefits, set of specifications and stages of implementation). Page 126-121 quality control: Definition of qualitative control, comprehensive examination method, samples and qualitative control schemes for the medium Page 131-127 arithmetic and range : Qualitative control charts for the standard deviation and the percentage of defective units. Page 138-131 Quality level and sampling (single, double and multiple). Reliability XI: Definition of reliability, failure function, probabilities, mean time to failure MTTF and variance, proportion function 152-149 Risk: The conditional reliability function, the exponential reliability function, and the Weibul reliability distribution. Page 155-152 Connecting the system in series (in the case of the exponential and Weibull distribution), linking in parallel page 162-155

	Discussion of reports submitted by students with regard to Chapter Three (Chapter Nine) with a test.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	General concepts. Values and attributes of information. Different types of information systems. Concepts of managerial information systems. Emphasis on analysis, design, and development of industrial information systems. Developing information systems by using microcomputer

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

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

	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction - Concepts and objectives of industrial engineering
Week 2	Technical and economic feasibility
Week 3	Industrial projects
Week 4	production costs
Week 5	productivity and methods of measuring
Week 6	work study
Week 7	Mid-term Exam + industrial
Week 8	Discussion Reports ,Linear programming
Week 9	Transfer problem model, Testing and improving the first solution in one of two ways
Week 10	relay models, Different technological paths, ideal substitution
Week 11	Total Quality Management TOM and ISO
Week 12	The concept of ISO 9000 quality control
Week 13	arithmetic and range , Quality level and sampling (single, double and multiple). , Reliability XI
Week 14	Connecting the system in series
Week 15	**Preparatory Week**

Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Methodical books: (1) d. Adel Abdel-Malik, "Industrial Engineering," Dar Al-Kutub for Printing and Publishing - Basra University - First Edition 2000. (2) d. Khalil Al-Ani, Dr. Ismail Ibrahim Al-Qazzaz, d. Adel Abdel-Malik Corial, "Total Quality Management and the Requirements of ISO 9001:2000," First Edition 2001, Press blond. Baghdad	Yes
Recommended Texts	Prem Kumar Gupta and D.S. Hira, Operations Research: an introduction, 2nd edition (1989), S. Chand & Company LTD, New Delhi.) Weekly hours: theoretical: 2 practical Charles E. Ebeling "An Introduction to Reliability and Maintainability Engineering" (1997), McGraw-Hill. Help books: (1) d. Mazen Bakr Adel and others, "Operations Research for Engineering Management," University of Mosul, 1986.	No
Websites		

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

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

	College of Engineering Department of Mechanical Engineering	

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	ENGINEERING ETHICS AND COMMUNICATIONS		**Module Delivery**	
Module Type	CORE		**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 401			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	UGx11 1	**Semester of Delivery**	1	
Administering Department	Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Mustafa M. Mansor	**e-mail**	Mustafa.muhammedali @utq.edu.iq	
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name		**e-mail**		
Review Committee Approval	01/06/2023	**Version Number**	1.0	

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

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This module aims to develop students' deeper understanding of Engineering Ethics, following the Royal Academy of Engineering approach. The study of engineering ethics within an engineering course helps students prepare for their professional lives. A specific advantage for engineering students who learn about ethics is that they develop clarity in their understanding and thought about ethical issues and the practice in which they arise. The study of ethics helps students to develop widely applicable skills in communication, reasoning and reflection. These skills enhance students' abilities and help them engage with other aspects of the engineering programme such as group work and work placements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply and conduct his or her engineering activities ethically, with the principles by professional ethics and responsibilities of the engineering practice. 2. Understand the nature of professional responsibility and be able to identify the ethical elements in decisions. 3. Be able to address and resolve problems arising from questionable practice. 4. Develop critical thinking skills and professional judgement and understand practical difficulties of bringing about change. 5. Develop a professional ethical identity to carry forward in their working life.
Indicative Contents المحتويات الإرشادية	The module will teach the following: Introduction to ethical theories, ethical dilemmas, ethical positions. Personal ethics. Professional ethics. Principles of Engineering ethical and case studies. Awareness of professional ethics issues, obligations, and responsibilities. Resolving practical problems through identifying ethical issues, examining opposing positions and making ethical decisions. The following of Sequence of engineering tasks • Preliminary preparation idea - market requirements the design • Mental visualization - Initial design - Performance specifications - Preliminary analysis • Detailed analysis Digital representations or laboratory models Material and parts specifications Detailed manufacturing drawings

	manufacturing • Scheduling tasks - procurement of parts and materials • Parts manufacturing - assembly or construction • Quality control – testing implementation • Advertising - Marketing and Finance - The Brief Guide to Parts and Operation • Transportation - Installation - Training of technicians - Establishing safety procedures and devices • Use of the product • Field service - maintenance - spare parts • Monitoring - Evaluation of impact on the environment - Communication of potential risks • Instantaneous • End tasks • Restoration, renovation and re-manufacturing service • Disposal of consumables and waste Classical Moral Theory as Applied to Science and Engineering, Evaluating Ethical Judgments, Persuasive Communications, Ethics in the Global Engineering Profession.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Engineering ethics is to sensitize the students to important ethical issues before you have to confront. You will study important cases from the past so that you will know what situations other engineers have faced and will know what to do when similar situations arise in their professional career. Finally, you will learn techniques for analyzing and resolving ethical problems when you arise

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem)	20	**Unstructured SWL (h/w)**	6.5

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to ethical theories,
Week 2	Ethical dilemmas,
Week 3	Ethical positions
Week 4	Personal ethics.
Week 5	Professional ethics.
Week 6	Principles of Engineering ethical and case studies.

Week 7	Mid-term Exam
Week 8	Awareness of professional ethics issues, obligations, and responsibilities
Week 9	Awareness of professional ethics issues, obligations, and responsibilities
Week 10	Awareness of professional ethics issues, obligations, and responsibilities
Week 11	Resolving practical problems through identifying ethical issues
Week 12	Resolving practical problems through identifying ethical issues
Week 13	Examining opposing positions
Week 14	Making ethical decisions.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	An introduction to the ethics of the engineering profession, The authors are Ronald Schenzinger, Mike Martin Translated by Dr. Yahya Khalif Obeikan Publishing, 2012 ISBN 9960549453, 9789960549453 The number of pages is 293 pages	Yes

Recommended Texts		
Websites		

APPENDIX:

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Design of Machine Systems**	MODULE **Delivery**
Module Type	CORE	**Theory** **Lecture** **Tutorial** **Seminar**
Module Code	**ME409**	
ECTS Credits	6	
SWL (hr./sem.)	150	

Module Level		UGIV	Semester of Delivery		8
Administering Department		Type Dept. Code	College	Type College Code	
Module Leader	Talib EH. Elaikh		e-mail	Talib-h@utq.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	Module Leader's Qualification		M.Sc.
Module Tutor	None		e-mail	None	
Peer Reviewer Name		Dr. Kazim Kareem	e-mail	zaid.ahmad@uobaghdad.edu.iq	
Review Committee Approval		/06/2023	Version Number		1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To understand the use of different types of springs and determine the safe design of springs under given conditions. 2. To determine forces on the transmission shaft and design of the transmission shaft. 3. To determine forces on the power screw and formulate a design solution for the size of the power screw. 4. To understand the standard nomenclature, forces, failures, application, and design procedure of Spur and Helical gears and to determine standard geometry under given loading conditions. 5. To understand the different types of bearings, applications, failures, and design procedures of Ball Bearings and Sliding contact bearings and to determine standard design procedures of bearing under different loading conditions
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	*On successful completion of this module, a student will be expected to be able to*: 1. Identify different types of loads and stresses. 2. Understand the design of shafts, keys, coupling, gears, belts, pulleys, and power screws. 3. Understand the design of springs and bearings. 4. Analyze stresses on different machine elements. 5. Think creatively about element design. 6. Design the different machine elements from a stress point of view

	7. Design the machine systems
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A –Design of transmission components Design of Power Screw [10 hrs.] Spring Design. [15 hrs.] Design of Shafts, Key, and Coupling [15 hrs.] Part B-Design Design of Sliding contact bearing and Rolling contact bearing. [10 hrs.] Belt Drive and Gear Design. [20 hrs.] Machine design system. [5 hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy for introducing this unit is encouraging students to participate in solving exercises while improving and extending their critical thinking skills. This will be achieved through the chapters and the preparation of reports on topics related to the core issue of machine design.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	1	5% (10)	2, 12	LO # 3, 4, 5 and 6
	Report	1	5% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr.	20% (10)	7	LO # 1-7
	Final Exam	3 hr.	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Design of Power Screw
Week 2	Design of Power Screw
Week 3	Spring Design
Week 4	Spring Design
Week 5	Shafts, Key, Coupling
Week 6	Shafts, Key, Coupling
Week 7	Mid-term Exam
Week 8	Sliding contact bearing
Week 9	Rolling contact bearing
Week 10	Belt Drive
Week 11	Belt Drive

Week 12	Gear Design
Week 13	Gear Design
Week 14	Machine design system
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Machin Design, R.S. KHURMI and J.K. GUPTA, EURASIA PUBLISHING HOUSE (PVT.) LTD.	Yes
Recommended Texts	Design of Machine Elements by V B Bhandari, McGraw Hill Education Private Limited.	Yes
Websites		

APPENDIX:

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

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

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Machine Design**			MODULE **Delivery**	
Module Type	CORE			**Theory**	
Module Code	**ME404**			**Lecture**	
ECTS Credits	6			**Tutorial**	
SWL (hr/sem)	150			**Seminar**	
Module Level	UGx11 **UGIV**		**Semester of Delivery**	7	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Talib EH. Elaikh		**e-mail**	Talib-h@utq.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr. Kazim Kareem		**e-mail**	zaid.ahmad@uobaghdad.edu.iq	
Review Committee Approval	/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	57. To understand the machine design procedure and develop an ability to apply it for simple component design. 58. To understand the different theories of failure and develop an ability to apply its knowledge for the design of the mechanical component and determine the resisting areas against failure

	59. To determine the endurance strength and design of components subjected to fluctuating loads 60. To determine the forces in weld joints and formulate a design solution for the weld size. 61. To determine forces on the bolted joints and formulate a design solution for the bolt size. 62. To understand the type of pressure vessel, pipe, and pipe Joints as well as determine the different stresses applied and dimensions of the pressure vessel and pipe
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this module, a student will be expected to be able to: 1. Be able to apply knowledge of the stress and strain of mechanical components; and understand, identify, and quantify factors of safety and failure modes for simple mechanical components subjected to direct and bending and combined loading. Acquire the skill and logic of finding resisting areas against failure and simple component design. 2. Develop the analytical ability to apply Knowledge of various theories of failures for the design of Mechanical components used in Industries like Joints, Bolts, Shafts, etc., and understand and develop the analytical ability to design shafts subjected to combined loading. 3. Understanding the mechanism of fatigue failures of parts and their use in mechanical component design. Be able to estimate the endurance strength of ductile and brittle materials and develop the analytical ability to apply fatigue theories for ductile and brittle material in static and dynamic loading 4. Understand different welded joint structures and able to apply their knowledge to analyze their strength when subjected to simple, coplanar, and eccentric loading. 5. Understand different stress in pressure vessels, pipes, and bolted Joints and be able to apply its knowledge for the design of pressure vessels and bolted joints.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Introduction Introduction to machine design, Review of stress and strain, The factor of safety, and design codes [10 hrs.] Torsional and Bending Stresses in Straight and Curved Beams. [15 hrs.]

	Static Failure Theories, Fatigue, and Variable Stresses [15 hrs.] Part B-Design Design of welded joint. [10 hrs.] Screws and Fasteners. [10 hrs.] Pressure vessels. [10 hrs.] Pipe and pipe joints. [5 hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy for introducing this unit is encouraging students to participate in solving exercises while improving and extending their critical thinking skills. This will be achieved through the chapters and the preparation of reports on topics related to the core issue of machine design.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 3,4, 10 and 11
	Assignments	1	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	5% (10)	13	LO # 5, 9 and 10
Summative assessment	Midterm Exam	2 hr.	20% (10)	8	LO # 1-7
	Final Exam	3 hr.	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to machine design, Design Methodology, Synthesis, and Material Selection.
Week 2	Review of stress and strain, The factor of safety, and design codes
Week 3	Torsional and Bending Stresses in Straight and Curved Beams
Week 4	Torsional and Bending Stresses in Straight and Curved Beams
Week 5	Static Failure Theories
Week 6	Fatigue and Variable Stresses

Week 7	Fatigue and Variable Stresses
Week 8	Mid-term Exam
Week 9	Design of welded joint
Week 10	Design of welded joint
Week 11	Screws and Fasteners
Week 12	Screws and Fasteners
Week 13	Pressure vessels
Week 14	Pipe and pipe joints
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Machin Design, R.S. KHURMI and J.K. GUPTA, EURASIA PUBLISHING HOUSE (PVT.) LTD.	Yes
Recommended Texts	Design of Machine Elements by V B Bhandari, McGraw Hill Education Private Limited.	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Mechanical Engineering	

MODULE DESCRIPTOR FORM

Module Information			
Module Title	**HUMAN RIGHTS AND DEMOCRACY**	**Module Delivery**	
Module Type	**SUPLEMENT**	**Theory** **Lecture** **Tutorial** **Practical** **Seminar**	
Module Code	**UR201**		
ECTS Credits	**1**		
SWL (hr/sem)	**50**		
Module Level	**UGII**	**Semester of Delivery**	**4**
Administering Department	**Department of Biomedical Engineering. UGV**	**College**	**Engineering College**
Module Leader	**Msc. Saad azeez**	**e-mail**	**Saad azeez 97@utq.edu.iq**
Module Leader's Acad. Title	**Msc.**	**Module Leader's Qualification**	**Msc.**
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	**20/6/2023**	**Version Number**	

Relation With Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	تعريف الطلبة بحقوقهم في كافة المجالات السياسية والاجتماعية والاقتصادية والدينية والثقافية وعرفة حدوده في المطالبة بتلك الحقوق على ان لا يضر ذلك بحقوق الاخرين وحرياتهم . مستندا بذلك على المواثيق الدولية والاقليمية والوطنية المتمثلة بالهياة الامم المتحدة ذات العلاقة والاعلان العالمي لحقوق الانسان سنة ١٩٤٠ والعهدين الدوليين لسنة ١٩٦٦ .
Module Learning Outcomes	On successful completion of this module the student will be able to: ١- قدرة الطالب على فهم حقوق الانسان. ٢- المساهمة الفعالة الفرد في المجتمع من خلال مشاركته في الانتخابات. ٣- التمييز لين المرشحين للانتخابات واختيار الافضل منهز للتمثيل الشعبي في مجلس النواب ٤- معرفة الحقوق الخاصة والعامة بما لا يضر مع حقوق الاخرين واحترام توجهاتهم وعقائدهم وافكارهم وعدم المساس بها . ٥- العمل في منظمات المجتمع المدني بشكل طوعي وبإرادته الحرة للمساهمة في بناء وطن حر ودولة ملتزمة بالقانون ٦- المطالبة بالحقوق والحريات وفق الاليات الدستورية و القوانين التي كفلت احرامها ٧- احترام القوانين والسير بها وعدم تجاوزها ٨- عدم المساس بكرامة الاخرين والتجاوز على حرياتهم والممتلكات العامة والخاصة

Indicative Contents	**Indicative content includes the following.** ١. مقدمة عن حقوق الانسان. (٥.hrs) ٢. الجذور التاريخية للديمقراطية وحقوق الانسان. (٥.hrs) ٣. التعريف بحق الفرد بالانتخابات . (٤hrs) ٤. معرفة الاصلح من المرشحين للتمثيل الشعبي . (٣hrs) ٥. معرفة الفرد لحقوقه وحقوق الاخرين . (٣hrs) ٦. سيادة القانون وعلاقته بالمنظمات المدنية . (٣hrs) ٧. الاليات التي كفلها الدستور لاحترام الحقوق والحريات . (٦hrs) ٨. مبدا احترام حقوق الاخرين وعدم التجاوز عليها . (٤hrs) ٩. الحقوق السياسية والاجتماعية والاقتصادية والثقافية والدينية للفرد. (٥hrs)
Learning and Teaching Strategies	
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)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	40	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	10	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	1, 2	LO #1, 3, 4
	Assignments	2	5% (5)	2, 5	LO # 3, 4, and 5
	Projects	1	5% (5)	Continuous	
	Report	1	10% (10)	6	LO # 4, 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	6	LO # 1-5
	Final Exam	2hr	60% (60)	14	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	مقدمة عن حقوق الانسان
Week 2	الجذور التاريخية للديمقراطية وحقوق الانسان
Week 3	الجذور التاريخية للديمقراطية وحقوق الانسان
Week 4	التعريف بحق الفرد بالانتخابات
Week 5	معرفة الاصلح من المرشحين للتمثيل الشعبي
Week 6	معرفة الاصلح من المرشحين للتمثيل الشعبي
Week 7	معرفة الفرد لحقوقه وحقوق وحريات الاخرين
Week 8	معرفة الفرد لحقوقه وحقوق الاخرين
Week 9	سيادة القانون وعلاقته بالمنظمات المدنية
Week 10	سيادة القانون وعلاقته بالمنظمات المدنية
Week 11	مبدا احترام حقوق الاخرين وعدم التجاوز عليها
Week 12	الحقوق السياسية والاجتماعية والاقتصادية والثقافية والدينية للفرد
Week 13	الحقوق السياسية والاجتماعية والاقتصادية والثقافية والدينية للفرد
Week 14	الحقوق السياسية والاجتماعية والاقتصادية والثقافية والدينية للفرد
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	ميثاق الامم المتحدة (١٩٤٥)	No
Recommended Texts	الاعلان العالمي لحقوق الانسان (١٩٤٨)	No
Websites	Headley, J. M. (2008). The Europeanization of the world: On the origins of human rights and democracy. Princeton University Press.	

APPENDIX

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

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.

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

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	PHYSICS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 103				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	ME		**College**	ER	
Module Leader	Dr. Salah I. Yahya		**e-mail**	salah.ismaeel@uobaghdad.edu.iq	
Module Leader's Acad. Title	Assist.Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr. Ahmed jassim		**e-mail**	Shkarah@utq.edu.iq	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Core Concepts: The aim of the physics module in engineering is to provide students with a solid understanding of core physics principles and concepts. This includes topics such as mechanics, electromagnetism, thermodynamics, and waves. The module aims to ensure that students develop a strong foundation in these fundamental principles, which are essential for various engineering disciplines. 2. Problem-Solving Skills: An important objective of the physics module is to develop students' problem-solving skills. Physics often involves complex problems that require analytical thinking, mathematical modeling, and the ability to apply theoretical concepts to real-world situations. The module aims to enhance students' ability to analyze and solve engineering problems using physics-based approaches. 3. Applications in Engineering: The physics module focuses on the application of physics principles in various engineering disciplines. Students will learn how to apply concepts such as forces, energy, electricity, and magnetism to analyze and design engineering systems and components. The aim is to enable students to understand the underlying physics behind engineering systems and to apply this knowledge in practical engineering applications. 4. Laboratory Skills: The physics module aims to develop students' practical skills through laboratory work. Students will engage in hands-on experiments, data collection, and analysis to validate theoretical concepts and gain practical insights. The module aims to enhance students' ability to design and conduct experiments, analyze data, and draw meaningful conclusions, thereby fostering their experimental and investigative skills. 5. Interdisciplinary Connections: The physics module aims to highlight the interdisciplinary nature of engineering. Students will explore how physics principles interact with other engineering disciplines, such as civil, electrical, and mechanical engineering. The module aims to cultivate an appreciation for the interconnectedness of different engineering fields and promote a holistic understanding of engineering systems.

	6. Critical Thinking and Problem Identification: The physics module aims to develop students' critical thinking skills and their ability to identify and define engineering problems. Students will learn to evaluate and analyze complex engineering scenarios, identify relevant physics principles, and propose effective solutions. The module aims to foster students' ability to think critically and creatively, enabling them to tackle engineering challenges with innovative approaches.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamental principles of classical mechanics, including Newton's laws of motion, conservation of energy, and momentum. 2. Apply mathematical tools, such as calculus and vector algebra, to solve problems related to motion, forces, and equilibrium in engineering systems. 3. Demonstrate knowledge of the properties of materials, including elasticity, viscosity, and thermal conductivity, and their application in engineering design and analysis. 4. Analyze and interpret experimental data using statistical methods and graphical representations, and draw conclusions based on the data. 5. Explain the principles of electricity and magnetism, including Ohm's law, electromagnetic induction, and Maxwell's equations, and apply them to the analysis and design of electrical circuits. 6. Understand the concepts of waves, optics, and sound, and their relevance to engineering applications, such as wave propagation, interference, and diffraction. 7. Apply the laws of thermodynamics to analyze and optimize energy conversion processes in engineering systems, including heat engines and refrigeration systems. 8. Demonstrate proficiency in using computational tools, such as simulations and numerical methods, to model and solve engineering problems related to physics. 9. Understand the principles of quantum mechanics and their applications in engineering fields, such as quantum electronics, nanotechnology, and quantum computing. 10. Apply the principles of fluid mechanics to analyze fluid flow and pressure in engineering systems, such as pipes, pumps, and turbines.

	11. Evaluate the environmental impact of engineering activities from a physics perspective, including the understanding of energy conservation, sustainability, and the mitigation of environmental hazards.
Indicative Contents المحتويات الإرشادية	Module 1: Classical Mechanics - Newton's laws of motion - Conservation of energy and momentum - Equilibrium and statics - Projectile motion and circular motion - Simple harmonic motion Module 2: Mathematical Tools for Physics - Calculus: differentiation and integration - Vector algebra and vector calculus - Coordinate systems and transformations - Differential equations in physics - Fourier analysis and series Module 3: Properties of Materials - Elasticity and Hooke's law - Stress, strain, and deformation - Fluid mechanics and viscosity - Thermal conductivity and heat transfer - Electrical properties of materials Module 4: Experimental Methods and Data Analysis - Measurement techniques and instruments - Uncertainty analysis and error propagation - Statistical analysis of data - Graphical representation of data - Experimental design and control Module 5: Electricity and Magnetism - Electric charge and electric fields - Gauss's law and electric potential - Electric current and circuits - Magnetic fields and forces - Electromagnetic induction Module 6: Waves, Optics, and Sound - Wave properties: frequency, wavelength, amplitude - Wave propagation: reflection, refraction, diffraction - Interference and diffraction of light - Geometric optics: lenses and mirrors - Doppler effect and sound propagation Module 7: Thermodynamics and Heat Transfer

	- Laws of thermodynamics - Heat and work in thermodynamic processes - Ideal gases and the gas laws - Heat engines and refrigeration systems - Heat transfer mechanisms: conduction, convection, radiation Module 8: Computational Physics - Numerical methods for solving physics problems - Simulation techniques and software tools - Modeling and analysis of complex systems - Data visualization and interpretation - Programming languages for scientific computing Module 9: Quantum Mechanics and Quantum Electronics - Wave-particle duality - Schrödinger equation and wave functions - Quantum states and operators - Quantum tunneling and superposition - Applications in nanotechnology and quantum devices Module 10: Fluid Mechanics - Fluid properties and behavior - Fluid statics and pressure measurement - Fluid dynamics and flow equations - Bernoulli's equation and its applications - Viscous flow and boundary layers Module 11: Environmental Physics - Energy conservation and sustainability - Environmental impacts of engineering activities - Pollution control and mitigation strategies - Hazard assessment and risk analysis - Renewable energy sources and technologies
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Engage students through interactive lectures where key concepts and principles are explained. Use visual aids, demonstrations, and real-life examples to enhance understanding. 2. Problem-Solving Sessions: Conduct regular problem-solving sessions where students can practice applying physics principles to engineering problems. Provide guided exercises and encourage collaborative problem-solving among students.

	3. Laboratory Work: Incorporate laboratory experiments to provide hands-on experience and reinforce theoretical concepts. Allow students to collect and analyze data, draw conclusions, and relate their findings to real-world engineering applications. 4. Computational Simulations: Utilize computer simulations and modeling software to illustrate complex physical phenomena and engineering systems. Encourage students to use these tools to simulate and analyze various scenarios. 5. Group Projects: Assign group projects that require students to apply physics concepts to engineering design challenges. This promotes teamwork, problem-solving skills, and practical application of theoretical knowledge. 6. Case Studies: Present case studies showcasing the role of physics in engineering projects or technological advancements. Analyze the challenges faced, the physics principles involved, and the solutions implemented. 7. Guest Speakers: Invite industry professionals or researchers to give guest lectures, sharing their experiences of applying physics principles in engineering fields. This provides students with real-world perspectives and career insights. 8. Concept Mapping: Encourage students to create concept maps or mind maps to visually organize and connect physics principles, equations, and their applications in engineering. This helps reinforce understanding and identify relationships between different concepts. 9. Online Resources: Provide access to online resources, such as interactive simulations, virtual labs, video tutorials, and supplemental reading materials. This allows students to explore topics at their own pace and reinforce their understanding. 10. Problem-Based Learning: Present students with real-life engineering problems that require the application of physics principles. Facilitate discussions and guide students to analyze the problems, propose solutions, and evaluate their feasibility. 11. Assessment Methods: Use a variety of assessment methods, including quizzes, tests, assignments, and projects, to evaluate students'

	understanding of physics in engineering. Provide constructive feedback to help students improve their knowledge and problem-solving skills. It is important to create a supportive and inclusive learning environment, where students feel comfortable asking questions, seeking clarification, and actively participating in class discussions. Regular feedback and communication with students can help identify areas of improvement and tailor teaching strategies to meet their learning needs.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
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, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Elementary mechanics with an emphasis on the fundamental concepts
Week 2	law of mechanic

Week 3	especially the conservation law
Week 4	Topics are scalar and vector quantities of mechanic rectilinear
Week 5	circular motion
Week 6	equilibrium and Newton's law of motion
Week 7	Mid-term Exam + work
Week 8	Energy1
Week 9	Momentum1
Week 10	the conservation law1
Week 11	Energy3
Week 12	Momentum2
Week 13	the conservation law2
Week 14	Energy3
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

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

Recommended Texts		No
Websites		

APPENDIX:

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

Note:

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