Academic Program Description

University Name: - Babylon University

College or Institute: - College of Engineering /Al-Musayyib

Scientific Section: - Air Conditioning and Refrigeration Engineering Department

Name of the Academic or Professional Program: - Academic Program for a Bachelor of Science in Air Conditioning and Refrigeration Engineering

Name of Final Degree: - Bachelor of Science in Air Conditioning and Refrigeration Engineering

Academic System: - Bologna

Description Preparation Date: (10/11/2024)

Filling Date of the Academic program description: (1/09/2025)

Signature:

Name of Head of Department: Asst. Prof. Dr Aws Akram Mahmood

Date: 13 / 05 / 2026

Signature:

Name of Assistant Dean for Scientific Affairs: Asst. Prof. Dr Sanaa Abdul Razzaq Jassim

Date: 13 / 5 / 2026

File Checked by:
Unit of Ensuring Quality and University Performance Manager
Manager Name Section Quality Assurance and University Performance:
Assist. Lect. Abbas Rashid

Date: 13 / 5 / 2026

جامعة بابل
كلية الهندسة / المسيب
شعبة ضمان الجودة
تقييم الاداء

Authentication Signature of the Dean

Asst. Prof. Dr. Wissam Jalil Khudair

13/5/2026

1. The program Vision

Leadership in engineering education and applied research locally and globally, while providing community services, building cooperation and exchange relationships with various local and international universities, and meeting the needs of the international community rich in advanced technology.

2. The Program message

Improving the level of industry and scientific research in the country requires the combined efforts of various scientific, engineering and administrative specializations, and since the Al-Musayyib engineering specialization is considered one of the most important elements of success in industrial processes as well as scientific research, therefore, accurate knowledge of this specialization is one of the basic requirements for advancement. Al-Musayyib College of Engineering takes upon itself the mission of spreading knowledge in this important field of knowledge and creating a generation of engineers and researchers who contribute effectively to the process of industrial and scientific advancement of the country.

3. The Program Goals

1- Teaching and training students to obtain a university degree in Bachelor of Engineering Sciences in Air Conditioning and Refrigeration engineering.
2- Preparing competent engineers in the field of Air Conditioning and Refrigeration engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders.
3- Applying educational quality standards in preparing curricula and other requirements of the educational process by applying national standards for engineering accreditation and specialized international standards. And the standards of a good educational laboratory (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001).
4- Active contribution to the development of the industrial management system and scientific capabilities in the field of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's field of specialization.
5- Participating in spreading engineering awareness, holding scientific courses, and field visits to the factories and companies that install and maintain air conditioning and refrigeration systems , and the ability to realize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly.
6- Continuing improvement in all aspects of the department's educational program. This is done by applying the principle of self-evaluation and benefiting from feedback.
7- Activating contribution to community service activities.

4. Program accreditation

Does the program have program accreditation? From which side?
The application for accreditation has already been submitted Iraqi Council for Accreditation of Engineering Education.

5. Other external influences

Is there a sponsor for the program?
Governmental support (Ministry of Higher Education and Scientific Research)

6. Program structure

Program structure	Number of courses	Study unit	Percentage	Comments
University requirements	8	16	%6.7	core
College requirements	3	18	%7.5	core
Department requirements	41	206	%86	core
Summer training	-	-	-	-
Other				

7. Program description

Year/Level	Name of the course	Course code	Credit hours	
			Theoretical	Practical
The first stage/ The first course	Engineering Drawing with AutoCAD I	ACR1101	1	5
	Mathematics I	ENM1102	4	0
	Electrical Engineering	ACR1103	3	2
	Physics	ENM1104	2	2
	Manufacturing Processes and Engineering Workshops	ACR1105	2	2
	English Language I	UOBABb1101	2	0
	Human Rights & Democracy	UOBAB1104	2	0
The first stage/ The second course	Mathematics II	ENM1211	4	0
	Engineering Drawing with AutoCAD II	ACR1212	1	5
	Engineering Mechanics (Statics)	ACR1203	4	0
	Material Science	ACR1204	2	2
	Mechanical and Electronic systems	ACR1205	3	0
	Computer I		2	2
	Arabic language I		2	0

Year/Level	Name of the course	Course code	Credit hours	
			Theoretical	Practical
The second stage/ The first course	Engineering Mathematics I	ACR2311	4	0
	Thermodynamics	ACR2312	5	2
	Fluid Mechanics	ACR2303	5	2
	Mechanical Drawing I with SolidWorks	ACR2314	3	2
	Arabic language II		2	0
	Crimes of the Baath Regime in Iraq		2	0
The second stage/ The second course	Engineering Mechanics (Dynamics)	ACR2411	4	0
	Heat Transfer	ACR2402	4	2
	Strength of Materials	ACR2403	3	2
	Mechanical Drawing II	ACR2414	4	0
	Engineering Mathematics II	ACR2415	3	0
	Computer II		1	2
	English Language II		2	0

8. Expected learning outcomes of the programme

Knowledge	
First	The ability to analyze refrigeration and air conditioning systems and identify faults and maintenance costs through the ability to identify, define, formulate, and solve engineering problems using the principles of engineering, science, and mathematics.
Second	Knowledge and familiarity with the operation and design of air conditioning and refrigeration systems and the use of the most important technologies and programs in air conditioning system design, through the ability to recognize the need to continue self-development of professional knowledge and how to correctly find, evaluate, compile, and apply it.
Skills	
First	The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for energy production and renewable energies, the requirements of the labour market and stakeholders within the restrictions of the type of use and other determinants through analysis and synthesis processes in the design process.
Second	The ability to evaluate the performance and efficiency of refrigeration systems through the ability to create and implement appropriate measurements and tests to ensure quality requirements are met, and the ability to analyze results and apply engineering judgment to reach conclusions.

Third	The ability to effectively lead and manage work teams, set goals according to capabilities, properly plan to achieve them, adhere to completion dates, and manage risk and uncertainty.
Values	
First	The ability to communicate effectively orally with a group of people and in writing with various administrative levels and for various purposes.
Second	The ability to recognize ethical and professional responsibilities in engineering issues and make sound judgments that take into account their consequences in the financial, environmental and societal fields on a global level.

9. Teaching and learning strategies

1- Method of giving lectures.
2- Student groups.
3- Workshops.
4-Scientific trips to follow the practical reality of refrigeration systems and central cooling units.
5- E-learning on campus.
6- Experiential learning.

10. Evaluation methods

1- Exams .
2- continuous assessment .
3- Reports .
4- stimulation .
5- feedback from students .

11.Academic Staff

Faculty members

Scientific rank		**Specialization**		**Special requirements /skills (if any)**		**Number of the teaching staff**	
		general	Private			Permanent	Adjunct collage Member
1	Professor Salam Hadi Hussain - Ph.D		Private			Permanent	
2	Assistant Professor Doctor Emad Dawood Aboud		Private			Permanent	
3	Lecturer Doctor Adnan		Private			Permanent	

	Qahtan Ibrahim- Ph.D						
4	Lecturer Fouad Abdel Amir Khalaf - Ph.D		Private			Permanent	
5	Assistant Professor Bashar Abed Hamza - Ph.D	General				Permanent	
6	Assistant Professor Maitham Hussein Rashid – MS.c degree	General				Permanent	
7	Lecturer Ahmed Riyadh Radhi – Ph.D	General				Permanent	
8	Lecturer Ahmed Hadi Hussain - Master's degree	General				Permanent	
9	Lecturer Noor Mohmmad Jassim– Ph.D	General				Permanent	
10	Assistant Lecturer Ahmed Saad Jasim- Master's degree	General				Permanent	
11	Assistant Professor Rusul Dawood Salman – MS.c degree	General				Permanent	
14	Lecturer Abdul Khaleq Ghali - Ph.D	General				Permanent	
15	Assistant Lecturer Mohmmad Kareem Mohmmad	General				Permanent	

Professional development

Orientation for New Faculty Members

Submit New faculty members to a distinguished orientation program with the support of the university by holding training courses in which old, experienced faculty members lecture to realize their potential as professors, researchers, and innovators, enabling them to participate and communicate in a positive environment that helps them integrate into the university community, and introduces them to the university environment, including its characteristics, basic values, and responsibilities. Related to rights and performance.

Professional development for faculty members

The teaching staff is subject to a group of activities, events, meetings, and scientific training provided by the relevant university entity to provide its employees in all programs with more knowledge, skills, and techniques related to the exercise of their professional roles (teaching, scientific research, community service).Under the heading of training and Professional development to improve the skills and knowledge of faculty members and academic leaders in all fields that enable them to carry out their assigned tasks to the fullest extent.

12. Acceptance standard

Central: A student who is accepted into universities is required to be:

1- Iraqi nationality.
2- Possessor of an Iraqi preparatory school certificate supported by a certification from the General Directorate of Education in the governorate or an equivalent certificate.
3- The student must be born in 2000 onwards.
4- Successful in the medical examination according to the conditions specific to each study, and the blind student (who meets the conditions for applying for appropriate humanitarian studies through central admission) will be able to apply.
5- Dedicated to study. It is not permissible to combine work and study (at the same time) in colleges and morning institutes. This includes employees of all government institutions. For them to continue studying in the morning, they must obtain study leave from their departments starting by following the instructions in force. It is also not permissible to combine two studies. If it is proven otherwise, he must write to the Ministry to cancel his acceptance.
6- The graduates:
    a. The current academic year.
    b. The previous academic year those who are not centrally accepted into any college or institute, they are accepted according to the minimum limits for the year of their graduation.
7- Non-Iraqi students who hold an Iraqi preparatory certificate and are accepted centrally will be informed in writing to review the Central Admissions Department / Expatriates Division to state their exemption or claim for tuition fees in foreign currency according to the controls mentioned in Chapter Seven.

13. The most important sources of information about the program

The college and university website
University guide
The most important books and resources for the department

- Heating, Ventilation, and Air Conditioning: Analysis and Design / Faye C. McQuiston, Jerald D. Parker, Jeffrey D .
- Principles of Heating, Ventilation and Air Conditioning in Buildings /John W. Mitchell, James E. Braun
- HVAC Fundamentals, Volume 1 & 2 /Samuel Sugarman
- ASHRAE Handbook – Fundamentals ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers)

14. Program development plan

Includes realistic improvement plans derived from consideration of available evidence and evaluations. It may be applied for more than one year, but it is prepared and reviewed every year at the level of academic courses, programs, and educational institutions.

Program Skills chart

Year / level	Course Name	Course Code	core or elective	Learning outcomes required from the programme						
				Knowledge		Skills			Values	
				1st	2nd	1st	2nd	3rd	1st	2nd
The First Stage /First course	Engineering Drawing with AutoCAD I	ACR1101	Core	*	*	*				
	Mathematics I	ENM1102	Core	*			*			
	Electrical Engineering	ACR1103	Core				*			
	Physics	ENM1104	Core				*			
	Manufacturing Processes and Engineering Workshops	ACR1105	Core		*	*				
	English Language I	UOBABb1101	Core					*	*	
	Human Rights & Democracy	UOBAB1104	Core							*
The First Stage /Second course	Mathematics II	ENM1211	Core	*			*			
	Engineering Drawing with AutoCAD II	ACR1212	Core	*	*	*				
	Engineering Mechanics (Statics)	ACR1203	Core		*	*				
	Material Science	ACR1204	Core	*						
	Mechanical and Electronic systems	ACR1205	Core	*		*	*			
	Computer I	UOBABb4	Core		*	*				
	Arabic language I	UOBAB1102	Core						*	

Program Skills chart											
				Learning outcomes required from the programme							
Year / level	Course Name	Course Code	core or elective	Knowledge		Skills			Values		
				1st	2nd	1st	2nd	3rd	1st	2nd	
The First Stage /First course	Engineering Mathematics I	ACR2311	Core	*	*		*	*			
	Thermodynamics	ACR2312	Core	*	*		*				
	Fluid Mechanics	ACR2303	Core	*	*		*				
	Mechanical Drawing I with SolidWorks	ACR2314	Core	*	*	*	*				
	Arabic language II		Core						*		
	Crimes of the Baath Regime in Iraq		Core							*	
			Core		*		*				
The First Stage /Second course	Engineering Mechanics (Dynamics)	ACR2411	Core	*	*		*				
	Heat Transfer	ACR2402	Core	*	*		*				
	Strength of Materials	ACR2403	Core		*	*	*				
	Mechanical Drawing II	ACR2414	Core	*							
	Engineering Mathematics II	ACR2415	Core		*	*	*				
	Computer II		Core						*		
	English Language II		Core	*	*		*	*			

	MODULE DESCRIPTION FORM **College of Engineering \AL-Musayib** **Air Conditioning and Refrigeration Engineering Department**	

UGI – level
Semester – One

Module Information					
Module Title	Engineering Drawing and Auto-CAD I			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ACR1101**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level	UGI		**Semester of Delivery**	One	
Administering Department	Air Conditioning and Refrigeration Engineering		**College**	College of Engineering \ Al-Musayab	
Module Leader	Qais Hatem Mohammed		**e-mail**	met.qais.hatem@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Qais Hatem Mohammed Ahmed Saad Jasim		**e-mail**	met.qais.hatem@uobabylon.edu.iq ahmed.saad.jas@uobabylon.edu.iq	
Peer Reviewer Name	Aws Al-Akam		**e-mail**	aws.al-akam@uobabylon.edu.iq	
Scientific Committee Approval Date	21/09/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Develop proficiency in technical communication and production of mechanical engineering drawings. 2. Develop skills in the preparation of working and assembly mechanical drawings. 3. Develop an understanding of the properties, uses and production of materials used in the manufacture of

	engineering components. 4. Provide knowledge of the different methods of production of engineering components. 5. Develop skills in communicating technical information using illustrations, scaled models and working drawings to solve engineering design problems. 6. Develop skills in applying and drawing principles to facilitate product development and manufacture. 7. Develop proficiency in the use of Computer-Aided Drafting (CAD) software, instruments, media and reference materials to produce engineering drawings. 8. Develop an interest in mechanical engineering as disciplines and careers. 9. Develop the capacity for critical and creative thinking, problem-solving, leadership and cooperative behaviors through authentic learning experiences.

Module Learning Outcomes	Upon successful completion of this course, the student will be able to: 1. Know the principles of Lettering and Dimensioning. 2. Know how to construct standard engineering curves. 3. Know how to construct a number of different geometrical constructions. 4. Know how to project solids in orthographic projection. 5. Know how to use Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures "different lines"). 6. Know how to use Computer-Aided Drafting software to produce drawings (different two-dimensional figures "surfaces").
Indicative Contents	**Indicative content includes the following.**[150] • Drawing Instruments and Accessories. [12 hrs.] • Lettering and Dimensioning Practices. [12 hrs.] • Geometrical Constructions. [46 hrs.] • Orthographic Projections. [40 hrs.] • Computer-Aided Drafting software (two-dimensional figures). [40 hrs.]

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

Student Workload (SWL)			
Structured SWL (h/sem)	88	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	150		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Drawing instruments and accessories, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures "different lines").
Week 2	Lettering and dimensioning practices, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures "different lines").

Week 3	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 4	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 5	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 6	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 7	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 8	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 9	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 10	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 11	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 12	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 13	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 14	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 15	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Drawing instruments and accessories, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 2	Lettering and dimensioning practices, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 3	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 4	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 5	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 6	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 7	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 8	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 9	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 10	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 11	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 12	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 13	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 14	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 15	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Engineering drawing, Abdul Rasoul Al Khafaf, University of Technology, Baghdad, Iraq, 1990.	Yes
Recommended Texts	Handbook of engineering drawing and AutoCAD, Mohammad Abid Muslim Altufaily, University of Babylon, Iraq, 2007	Yes
Websites	https://www.youtube.com/@suffy96/courses www.youtube.com/@1styearengineeringdrawing182	

Group	**Grade**	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors

	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	45 - 49	More work required but credit awarded
	F – Fail	0 - 44	Considerable amount of work required

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

Module Information			
Module Title	Manufacturing Processes and Engineering Workshops	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ACR1103**		
ECTS Credits	**4**		
SWL (hr/sem)	100		
Module Level	UGI	**Semester of Delivery**	One
Administering Department	Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab
Module Leader	Ahmed Saad Jasim	**e-mail**	ahmed.saad.jas@uobabylon.edu.iq
Module Leader's Acad. Title	Assist Lecturer	**Module Leader's Qualification**	MSC
Module Tutor	Ahmed Saad Jasim	**e-mail**	ahmed.saad.jas@uobabylon.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	21/09/2025	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	**1-** To describe machining operations and machine tools, including turning, drilling, milling, grinding, and other abrasive processes, as well as conventional machining operations such as shaping and planing, broaching, and sawing. **2-** To explain bulk deformation processes in metal working, including rolling, forging, extrusion, and wire and bar drawing, as well as sheet metal forming processes such as cutting, bending, and drawing. **3-** To identify and explain joining and assembly processes, including fundamentals of welding, arc welding, resistance welding, oxyfuel gas welding, soldering, and brazing.

Module Learning Outcomes	7. Describe turning and related machining operations and their industrial applications. 8. Identify drilling operations and recognize different drilling machines and their uses. 9. Describe milling processes and explain their basic machining principles. 10. Analyze grinding and other abrasive processes and their role in improving surface quality. 11. Differentiate and compare other machining operations such as shaping, planing, broaching, and sawing. 12. Explain rolling and related processes in bulk deformation of metals. 13. Describe forging processes and their applications in manufacturing industries. 14. Apply knowledge of extrusion processes and their role in metal forming. 15. Compare and analyze wire and bar drawing processes and their main characteristics. 16. Explain sheet metal working processes, including cutting, bending, and drawing operations. 17. Define and identify the fundamentals and basic principles of welding. 18. Apply concepts of arc welding and explain its industrial applications. 19. Differentiate and explain resistance welding and oxy-fuel gas welding processes. 20. Describe soldering and brazing processes and their industrial applications. 21. Integrate and apply knowledge of all manufacturing processes covered in the course.
Indicative Contents	**Indicative content includes the following.**[60] • Machining operations and machine tools, including turning and related operations, drilling and related operations, milling, grinding and other abrasive processes, and other conventional machining operations such as shaping, planing, broaching, and sawing. [20 hr] • Bulk deformation processes in metal working, including rolling and related operations, forging and related operations, extrusion, and wire and bar drawing, as well as sheet metal working processes such as cutting, bending, and drawing. [20 hr] • Joining and assembly processes, including fundamentals of welding, arc welding, resistance welding, oxyfuel gas welding, soldering, and brazing. [20 hr]

Learning and Teaching Strategies	
Strategies	Teaching and learning strategies include a combination of whole-class, group, and individual activities designed to accommodate different student abilities, skills, learning speeds, and learning styles. These strategies encourage active participation and support students in achieving successful learning outcomes. Instruction is planned based on students' needs and learning preferences.

Student Workload (SWL)			
Structured SWL (h/sem)	59	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	41	**Unstructured SWL (h/w)**	2.5
Total SWL (h/sem)	100		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	5, 10, and14	LO #1- #4, #5 - #9 and #10 - #13
	Assignments	2	10% (10)	6 and 11	LO #1 - #5 and #6 - #10
	Report	1	5% (5)	13	All
	Practical	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	11	LO #1 - #10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Turning and Related Operations
Week 2	Drilling and Related Operations
Week 3	Milling
Week 4	Grinding and Other Abrasive Processes

Week 5	Other Machining Operations: (1) shaping and planing, (2) broaching, and (3) sawing
Week 6	Rolling and Related Operations
Week 7	Forging and Related Operations
Week 8	Extrusion, Wire and Bar Drawing
Week 9	Wire and Bar Drawing
Week 10	Sheet Metal Working / (1) Cutting Operations, (2) Bending Operations, (3) Drawing
Week 11	Fundamentals of Welding
Week 12	Arc welding
Week 13	Resistance welding, Oxyfuel gas welding
Week 14	Soldering, Brazing
Week 15	**Preparatory week before the final Exam**
Week 16	

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	**A) Turning Workshop:** The turning workshop provides students with training on: **1.** Straight turning operations: adjusting correct measurements for different diameters and lengths using a triangular turning tool.
Week 2	**2.** Arc turning operations: producing arcs on the same workpiece used in the first exercise, ensuring accuracy according to the drawing and verified measurements.
Week 3	**3.** Angle machining: introducing students to shaping tools such as the square tool and the 55° corner tool for producing different angles.
Week 4	**Exam:** A theoretical and practical assessment is conducted to evaluate the student's knowledge and skills acquired in the turning workshop.
Week 5	**B) Filing Workshop:** The filing workshop provides training on: **1.** Filing flat surfaces as well as straight and inclined angles with accuracy and proper technique.
Week 6	**2.** Sawing operations, including proper handling and use of hand saws and sawing techniques.
Week 7	**3.** Hand drilling and vertical drilling machines, focusing on operating procedures, safe usage, and correct drilling techniques.
Week 8	**Exam:** A theoretical and practical assessment is conducted to evaluate the student's knowledge and skills acquired in the filing workshop.
Week 9	**C) Welding Workshop:** The welding workshop trains students on various welding processes, including: **a)** Manual Arc Welding (SMAW): Understanding the formation of the electric arc between two electrodes.
Week 10	**b)** Training on producing straight and uniform welding beads.
Week 11	**c)** Training on welding structural joints and increasing workpiece thickness through buildup welding.
Week 12	**2.** Gas Welding (Oxy-Acetylene): Training on flame control, heat adjustment, and welding techniques using oxy-acetylene equipment.
Week 13	**3.** Shielded Arc Welding (TIG & MIG): Using inert gases such as argon (TIG welding with tungsten electrodes) and carbon dioxide (MIG welding).
Week 14	**4.** Resistance Welding: Specifically spot welding techniques and their industrial applications.
Week 15	**Exam:** A theoretical and practical assessment is conducted to evaluate the student's knowledge and skills acquired in the welding workshop.

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	[1] Groover, Mikell P. ***Fundamentals of modern manufacturing: materials, processes, and systems***. John Wiley & Sons, 2020.	No
Recommended Texts		No
Websites	[1]https://books.google.com/books?hl=ar&lr=&id=mB7zDwAAQBAJ&oi=fnd&pg=PA1&dq=FUNDAMENTALS+OF+MODERN+MANUFACTURING+Materials,Processes,andSystems+Fourth+Edition&ots=H1hck34oBY&sig=os2Xrjr-16zwPs6JVbGDcG4fuy8	

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

Module Information					
Module Title	**Physics**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENM1101**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGI	**Semester of Delivery**		One
Administering Department		Air Coediting. and Refrigeration.	**College**		College of Engineering\Al-Musayab
Module Leader	Abbas Rashid Hatif		**e-mail**		Eng934.abbas.rashid@uobabylon.edu.iq
Module Leader's Acad. Title		Assist. Lecturer	**Module Leader's Qualification**		MSc
Module Tutor	-		**e-mail**		-
Peer Reviewer Name	-		**e-mail**		-
Scientific Committee Approval Date		21/09/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	-	**Semester**	-
Co-requisites module	-	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Analyze the atomic structure of matter at its most fundamental. 2. Recognize the state of matter and its properties. 3. Understand the forms of energy. 4. Solve problems that call for the application of conservation of energy. 5. Know the classification of the semiconductors and the mechanism behind them. 6. Explain the basic properties of light and describe some of its applications in engineering.

Module Learning Outcomes	1. Understanding the basic concepts and definitions is important in any field of study. 2. Learning the properties of individual atoms and molecules, as well as how they interact with each other. 3. knowing the physical and chemical properties of each state, such as gas, liquid, and solid, as well as understanding how the atoms and molecules interact with each other in the various states. 4. Be familiar with how the forms of energy interact with one another and how they are used. 5. Understanding how energy can be converted from one form to another as well as familiarity with the equations involved. 6. Learning how semiconductors are classified and what the mechanisms are behind each type of semiconductor. 7. Applying the light fundamental principles and how engineers are able to create complex technological solutions.
Indicative Contents	**Indicative content includes the following**. • Some basic concepts and definitions, how atomic structure is formed and interatomic bonding energy and classification, properties of matter, state of matter, energy sources, kinetic energy, and work. • Potential energy, thermal properties of matter, how heat and law of thermodynamics applied, what are the fluid characteristics, electric field, and potential. • Classifications of Conductor and insulator materials, semiconductors, propagation of light and optics characteristics, and elements of solid-state physics.

Learning and Teaching Strategies	
Strategies	This module will be taught in such a way that students will be compelled to participate in the exercises and their critical thought skills will be refined and expanded through participation. Classes and interactive tutorials will be used in order to reach this goal, as well as considering the types of simple experiments involving sampling activities that the learners might find interesting as well. The module will also include group activities, which will encourage collaboration and the exchange of ideas. This will help to create an engaging learning experience for the students and will also help them to develop their communication skills.

Student Workload (SWL)			
Structured SWL (h/sem)	59	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	66	**Unstructured SWL (h/w)**	4.5
Total SWL (h/sem)	**125**		

Module Evaluation					
		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
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All

Total assessment	100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Some basic concepts and definitions
Week 2	Atomic structure and interatomic bonding
Week 3	Properties of matter
Week 4	State of matter
Week 5	Energy sources
Week 6	Kinetic Energy and work
Week 7	Potential energy (Mid-term Exam)
Week 8	Thermal properties of matter
Week 9	Heat and law of thermodynamics
Week 10	Fluids
Week 11	Electric field and potential
Week 12	Conductor and insulator materials
Week 13	Semiconductors
Week 14	Lights and optics
Week 15	Elements of solid-state physics
Week 16	**Preparatory week before the final Exam**

Delivery Plan Weekly (Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Photon energy
Week 2	Lab 2: Data analysis for calculating Plank's constant
Week 3	Lab 3: Energy distribution
Week 4	Lab 4: Electrical properties of insulated materials
Week 5	Lab 4: Light interaction with matter

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Halliday, D., Resnick, R., & Walker, J. (2013). Fundamentals of physics. John Wiley & Sons.	Yes
Recommended Texts	Radi, H., & Rasmussen, J. O. (2013). Principles of physics. Springer.	Yes
Websites		

Group	Grade	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	45 - 49	More work required but credit awarded
	F – Fail	0 - 44	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University			

has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above

Module Information					
Module Title	Mathematics I			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENM1102**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level		UGI	**Semester of Delivery**		One
Administering Department		Air Conditioning and Refrigeration Engineering	**College**		College of Engineering \ Al-Musayab
Module Leader	Ahmed Hadi Hussain		**e-mail**		met.ahmed.hadi@uobabylon.edu.iq
Module Leader's Acad. Title		Asst.proff	**Module Leader's Qualification**		MSc
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		21/09/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Enable the pupil to learn the concepts of mathematics and applications in his work
Module Learning Outcomes	1. Describe the characteristics and properties of number sets, and obtain the number systems, 2. Describe and State the concept of function, draw the graph of functions, the lists types of functions. 3. To understands the meaning of limit and continuous function. 4. To knows the meaning of derivative function and applications. 5. Describe the transcendental function. 6. Describe the Unit vector, vector equation, cross product, dot product. 7. To understands the meaning of complex number. 8. Describe the matrix and its operations and to know the determent of its.
Indicative Contents	**Indicative content includes the following.**[150] • Type of sets, type of interval, Cartesians plain and The domain and rang of functions, even and odd functions and Drawing curved function, shifting the graph. . [12 hrs.] • limit from the left and right and The concept of continuous function, Algebraic operations on continuous functions and Methods of derivation, the chain rule. [12 hrs.] • Applications on derivatives,slope,L'hopital role and Kind of exponential functions and Types of trigonometric functions, The inverse of the trigonometric functions and Derivative of this functions. [46 hrs.]

	• Kind of Hyperbolic functions and Derivative of this functions and Meaning vector, algebraic properties of vectors and vector equation, cross product, dot product and Types of matrices, operations on matrices.. [40 hrs.] • Use matrices in solving linear systems of equations.using Grammer Role and inverse matrix and properties of complex numbers, the representation of the complex number .[40 hrs.]

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

Student Workload (SWL)			
Structured SWL (h/sem)	59	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	150		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	5 and 10	LO #3, #4, #5, and #6
	Assignment	15	10% (10)	Continuous	All
	Home work	15	10% (10)	Continuous	LO #3, #5 and #6
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #5- #11
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Type of sets, type of interval, Cartesians plain
Week 2	The domain and rang of functions, even and odd functions
Week 3	Drawing curved function, shifting the graph.
Week 4	limit from the left and right
Week 5	The concept of continuous function, Algebraic operations on continuous functions
Week 6	Methods of derivation, the chain rule
Week 7	Applications on derivatives,slope,L'hopital role
Week 8	Kind of exponential functions
Week 9	Types of trigonometric functions, The inverse of the trigonometric functions and Derivative of this functions
Week 10	Kind of Hyperbolic functions and Derivative of this functions
Week 11	Meaning vector, algebraic properties of vectors
Week 12	vector equation, cross product, dot product
Week 13	Types of matrices, operations on matrices.
Week 14	Use matrices in solving linear systems of equations.using Grammer Role and inverse matrix
Week 15	properties of complex numbers, the representation of the complex number.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	George B. Thomas Jr, Weir Joel R. Hass 'Calculus' (V.12), 2014.	Yes
Recommended Texts	Engineering Mathematics, stroud.	Yes
Websites		

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

Module Information			
Module Title	English Language I	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**UOBABb1101**		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGI	**Semester of Delivery**	One
Administering Department	Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab
Module Leader	Rasul Daoud Salman	**e-mail**	met.rusul.dawood@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	MSC
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	62/06/2022	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Developing reading, writing, speaking, and listening skills. 2. Providing an overview of theoretical perspectives on student learning and development. 3. Providing an overview of a variety of important issues in the English language that help students communicate easily with others. 4. Applying theoretical concepts to provide students with opportunities to practice the language and encourage them to speak with native speakers. 5. Equipping students with the ability to express their opinions and participate in discussions. 6. Using a variety of digital devices and tools to interpret and construct meaning.
Module Learning Outcomes	1) The ability to understand language usage in the context of specific purposes. 2) Identifying the most important everyday expressions that can be applied in real life. 3) Developing evidence-based arguments. 4) Educating students on the correct use of English grammar in writing and speaking. 5) Improving students' English language skills in terms of fluency and clarity. 6) Students will give oral presentations and receive feedback on their performance. 7) Improving students' reading skills through extensive reading. 8) Equipping students with a large vocabulary. 9) Apply grammatical rules in communicative contexts such as: classroom activities, reading and writing, and homework assignments. 10) Enhance students' ability to write essays and academic papers. 11) Improve students' proficiency in four key areas: writing, speaking, reading, and listening.
Indicative Contents	The instructional content includes the following: • Focus on four key aspects of the English language: writing, speaking, reading, and listening [5 hours] • Understanding the general topic or main idea, key points, important facts and details, vocabulary in context, and pronoun references [5 hours] • Grasping the main idea, key points, and important details related to the main idea [5 hours] • Students must be able to speak successfully both inside and outside the classroom [5 hours] Part B – Analog Electronics Basics

	• Identify tenses, choose the correct form, and arrange sentences in the correct order [10 hours] • Cover aspects such as phonetics, semantics, and pragmatics [10 hours] • Explore the basic components of language, understand language at a deeper level, and learn how to construct words and sentences so that others can understand them. [10 hours]

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

Student Workload (SWL)			
Structured SWL (h/sem)	31	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	19	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	50		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	20% (20)	5 ,13,15	#1, #2 , #10, #11
	Assignment	2	10% (10)	2 , 12	#3, #4 , #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	#5, #8 ,#10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction – Providing general information about the English language
Week 2	Speaking (Multiple Choice) – Asking for general opinions on potential issues
Week 3	Speaking (Campus Announcements and General Conversation) – Presenting the speaker's opinion and explaining the reasons behind it
Week 4	Integrated Speaking (Academic Reading and Lecture) – Explaining academic topics and describing their main points.
Week 5	Listening to an engineering conversation to acquire a broad vocabulary
Week 6	Listening to various videos related to engineering fields such as: (mechanical engineering, electrical engineering, and renewable energy).
Week 7	Midterm exam
Week 8	Writing (teaching students how to write essays in the field of engineering)
Week 9	Writing (enabling students to write their opinions on a general academic topic or to write about a specific engineering topic).
Week 10	Speaking (Have students summarize the main points of a lecture that was previously delivered)
Week 11	Speaking (Increase the student's ability to speak fluently and improve their fluency)
Week 12	Listening (Encourage the student to draw conclusions from what they have heard)
Week 13	Listening (Ask the student what the speaker means in their speech)
Week 14	Writing (Ask the student to write down the key information in the highlighted sentences in the paragraph and rephrase those sentences)

Week 15	Writing (Encourage the student to identify the most important issues in the paragraph)
Week 16	The preparatory week before the final exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	TOEFL Practice Online The official practice test that can help you go anywhere	No
Recommended Texts	The Cambridge Encyclopedia of the English Language By David Crystal	No
Websites	https://www.cambridge.org./	

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

Module Information					
Module Title	**Human Rights and democracy**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**UOBAB1104**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGI		**Semester of Delivery**	One	
Administering Department	Air-conditioning and Refrigeration Engineering		**College**	College of Engineering\Al-Musayab	
Module Leader	Abdulkhaliq Gali Mahdi		**e-mail**	abdkhaliqmahdi@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name	-		**e-mail**	-	
Scientific Committee Approval Date	21/09/2026		**Version Number**	1	

Relation with other Modules			
Prerequisite module	-	**Semester**	-
Co-requisites module	-	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Enhancing students' understanding of the conceptual theoretical dimensions and historical development of Human Rights and Democracy. 2. Developing students' ability to critically analyze the current state and future prospects of human rights and democratic practices. 3. Training students on the importance of active participation in public life, promoting respect for human rights, and engaging effectively in political and cultural spheres. 4. Empowering students to understand the role of education in spreading a culture of democracy and building a civilized society based on good governance, human rights advocacy, and free and fair elections.
Module Learning Outcomes	1. Students will acquire a comprehensive understanding of the laws and fundamental principles of human rights throughout the academic year. 2. Preparing a socially conscious generation with a deep understanding of human rights issues and responsibilities. 3. Consolidating the concepts of rights and democracy among students and promoting their dissemination within society. 4. Keeping students abreast of international experiences and familiarizing them with key global resolutions, conventions, and human rights instruments. 5. Understanding human rights in Islamic law and from various cultural perspectives 6. The ability to identify human rights mechanisms at the national and international levels
Indicative Contents	The instructional content includes the following: [50] 1. A daily discussion to assess students' understanding of the material and evaluate their daily participation. 2. Daily quizzes with short, varied scientific questions to assess their understanding of the material. 3. Allocating a portion of each semester's grade to homework assignments. 4. Daily quizzes and monthly exams on the curriculum, as well as a final exam

Learning and Teaching Strategies	
Strategies	The importance of the course on human rights and democracy lies in students' study of the most significant rights enshrined in international norms and laws, as well as those found in Islamic law and Iraqi constitutions—particularly the current Constitution of 2005—and in students' familiarity with international covenants issued regarding human rights. On the one hand, this involves familiarizing students with the democratic experiences of other nations so that we may learn from them.

Student Workload (SWL) Calculated over 15 weeks			
Structured SWL per Semester (h/sem)	31	**Structured SWL per Week (h/w)**	2
Unstructured SWL per Semester (h/sem)	19	**Unstructured SWL per Week (h/w)**	1

Total SWL per Semester (h/sem)	50

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 , 10	#3, #4, #5, #6
	Home work	15	10% (10)	continuous	All
	Assignments	15	10% (10)	continuous	All
	Projects				
	Report	5	10% (10)	4,7,11,13, 14	#3, #5, #6
Summative assessment	Midterm Exam	2hr	10% (10)	7	#1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Theoretical Weekly Syllabus)	
	Material Covered
Week 1	The Concept of Human Rights and Their Characteristics and Features
Week 2	Human Rights in Ancient History
Week 3	Legal Personality: Definition and Characteristics
Week 4	The Stance of Divine Scriptures and Western Civilizations on Human Rights
Week 5	Sources of Human Rights: International Sources of Human Rights – -
Week 6	National Sources of Human Rights
Week 7	Guarantees of Human Rights: International and Regional Guarantees – - Midterm Exam
Week 8	National Guarantees: Guarantees of Human Rights in Islam – -
Week 9	The Historical Development of Children's Rights and Children's Rights in International Conventions
Week 10	Democracy: Its Concept and Historical Development
Week 11	The Pillars of Democracy
Week 12	Democratic Elections
Week 13	Types of Democratic Systems of Government
Week 14	The Rule of Law and the Separation of Powers
Week 15	The Impact of the Media and Globalization on Human Rights
Week 16	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Dr. Hameed Hanoun Khalid, Human Rights.	Yes
Recommended Texts	Dr. Fakhri Rashid Al-Mihna and Dr. Salah Yassin Dawood, International Organizations, University of Mosul.	No
Websites		

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

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

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

Module Information

Module Title	**Electrical Engineering**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ACR1103**		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGI	**Semester of Delivery**	One
Administering Department	Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab
Module Leader	Ali Sabri Allaw	**e-mail**	met.ali.sabry@uobabylon.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/09/2025	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. To study Ohm's law 2. To study electrical circuits; series, parallel, and series-parallel in d.c. 3. To apply a methods of analysis on d.c. circuits 4. To apply electrical theorems on d.c. circuits 5. To understand the sinusoidal waveforms in electrical circuits. 6. To understand the response of Capacitor, Inductor, and resistor. 7. To understand the complex numbers. 8. To perform conversion between time domain and phasor domain and vice versa. 9. To apply the methods of analysis in ac circuits 10. To apply the circuit theorems in ac circuits To understand power in ac circuits

Module Learning Outcomes	1. Studying ohm's law 2. Studying types of circuits in d.c. and methods to analyze them. 3. Recognize ac components and their response; capacitor, inductor, and resistor. 4. List the various terms associated with ac electrical circuits. 5. Understand complex numbers in order to apply them in ac circuits 6. Discuss the average and the rms values. 7. Apply Kirchhoff's laws on ac circuits 8. Understand methods of analysis in ac circuits 9. Apply electrical theorems in ac circuits.
Indicative Contents	**Indicative content includes the following**. Part A - Circuit Theory • studying d.c. electrical circuits. [12 hrs] • analyzing d.c. electrical circuits.[13 hrs] • Sinusoidal waveforms, average (dc) value, effective (rms) value [8 hrs] • Time domain and phasor domain. [8 hrs] • Complex numbers: rectangular and polar phorm [8 hrs] • Methods of circuit analysis and their applications on ac circuits; mesh and nodal methods. [12 hrs] • Electrical circuit theorems and their application on ac circuits: Superposition , Thevenin, And Norton. [12 hrs] • Power in ac circuits: power triangle, real power, reactive power, and apparent power; impedance triangle. [12 hrs]

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

Student Workload (SWL)			
Structured SWL (h/sem)	73	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	52	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	125		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	2,5,8,12	LO #3, #4, #5, and #6
	Assignment	15	10% (10)	Continuous	All
	Projects / Lab.	15	10% (10)	Continuous	LO #3, #5 and #6
	Report	15	10% (10)	Continuous	#3, #5 , #6
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Dc circuits; series , parallel , series-parallel
Week 2	Methods of analyzing d.c. circuits
Week 3	Electrical theorems
Week 4	Review of Kirchhoff's Laws on ac circuits
Week 5	Star delta and delta star conversion in ac circuits
Week 6	RLC circuits

Week 7	Mid-term Exam
Week 8	Series and parallel circuits
Week 9	Series – parallel circuits in ac circuits
Week 10	Methods of analysis in ac circuits I
Week 11	Methods of analysis in ac circuits II
Week 12	Electrical theorems in ac circuits I
Week 13	Electrical theorems in ac circuits II
Week 14	Power and power triangle
Week 15	Power , apparent power , reactive and real power
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: series-parallel dc circuits
Week 2	Lab 2: Norton's theorem
Week 3	Lab 3: RLC circuits
Week 4	Lab 4: Kirchhoff's laws
Week 5	Lab 5: mesh method
Week 6	Lab 6: superposition theorem
Week 7	Lab 7: Thevenin theorem

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Introductory circuit analysis by Boylestad	Yes
Recommended Texts	Introductory circuit analysis by Boylestad	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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

UGI – level
Semester – Two

Module Information

Module Title	Engineering Drawing and Auto-CAD II			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ACR1211**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level		UGI	**Semester of Delivery**		Second
Administering Department		Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab	
Module Leader	Qais Hatem Mohammed		**e-mail**	met.qais.hatem@uobabylon.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Qais Hatem Mohammed Ahmed Saad Jasim		**e-mail**	met.qais.hatem@uobabylon.edu.iq ahmed.saad.jas@uobabylon.edu.iq	
Peer Reviewer Name	Aws Al-Akam		**e-mail**	aws.al-akam@uobabylon.edu.iq	
Scientific Committee Approval Date		21/09/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	Engineering Drawing and Auto-CAD I	**Semester**	First
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Visualize and Sketch: Develop the ability to visualize 3D objects and represent them in 2D through freehand sketching and pictorial projections. 2. Master Projections: Understand and draw isometric views/projections of geometric solids. 3. Develop Sectional Views: Create sectional views to reveal internal details of complex engineering components. 4. Use CAD Tools: Acquire proficiency in Computer-Aided Design (CAD) software for creating, editing, and modeling 3D shapes. 5. Create Working Drawings: Prepare comprehensive, accurate, and properly dimensioned technical drawings suitable for manufacturing. 6. Interpret Blueprints: Read and interpret, with accuracy, drawings generated by others. 7. Visualize Intersections & Developments: Understand how to project intersecting sur-faces and develop the surfaces of 3D objects.
Module Learning Outcomes	Upon successful completion of this course, the student will be able to: 22. Projections and Visualization: Ability to project 3D objects onto 2D surfaces using isometric, auxiliary, and sectional views. 23. Engineering Imagination: Enhancing the ability to visualize 3D objects from 2D drawings. 24. Dimensioning and Standards: Applying proper dimensioning, tolerance, and annotations to conform to industrial standards. 25. Computer-Aided Drafting (CAD): Creating, editing, and dimensioning 3D models using software AutoCAD. 26. Sectional Views: Representing internal details of complex objects through sectioning techniques. 27. Machine/Technical Drawings: Interpreting, assembling, and disassembling engineering drawings, including understanding technical specifications.
Indicative Contents	**Indicative content includes the following.**[150] • Develop the pictorial drawing Isometric type from orthographic projections. [40 hrs.]

	• Find the third missing orthographic projection from two given orthographic projections. [30 hrs.] • Find the sectional views for a given body and section plan. [20 hrs.] • Computer-Aided Drafting software (two-dimensional figures). [60 hrs.]

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

Student Workload (SWL)			
Structured SWL (h/sem)	88	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	150		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Isometric drawing**
Week 2	**Isometric drawing**
Week 3	**Isometric drawing**
Week 4	**Isometric drawing**
Week 5	**Isometric drawing**
Week 6	**Isometric drawing**
Week 7	**Monthly exam**
Week 8	**Sectioning and sectional views**
Week 9	**Sectioning and sectional views**
Week 10	**Sectioning and sectional views**
Week 11	**Sectioning and sectional views**
Week 12	**Obtaining missing views and isometric drawing**
Week 13	**Obtaining missing views and isometric drawing**
Week 14	**Obtaining missing views and isometric drawing**
Week 15	**Mid exam**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	**Isometric drawing**
Week 2	**Isometric drawing**
Week 3	**Isometric drawing**
Week 4	**Isometric drawing**
Week 5	**Isometric drawing**

Week 6	**Isometric drawing**
Week 7	**Monthly exam**
Week 8	**Sectioning and sectional views**
Week 9	**Sectioning and sectional views**
Week 10	**Sectioning and sectional views**
Week 11	**Sectioning and sectional views**
Week 12	**Obtaining missing views and isometric drawing**
Week 13	**Obtaining missing views and isometric drawing**
Week 14	**Obtaining missing views and isometric drawing**
Week 15	**Mid exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Engineering drawing, Abdul Rasoul Al Khafaf, University of Technology, Baghdad, Iraq, 1990.	Yes
Recommended Texts	Handbook of engineering drawing and AutoCAD, Mohammad Abid Muslim Altufaily, University of Babylon, Iraq, 2007	Yes
Websites	https://www.youtube.com/@suffy96/courses www.youtube.com/@1styearengineeringdrawing182	

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

Module Information					
Module Title	Mathematics II			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENM1213				
ECTS Credits	**7**				
SWL (hr/sem)	175				
Module Level		UGI	**Semester of Delivery**		Two
Administering Department		Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab	
Module Leader	Ahmed Hadi Hussain		**e-mail**	met.ahmed.hadi@uobabylon.edu.iq	
Module Leader's Acad. Title		Asst.proff	**Module Leader's Qualification**		MSc
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		21/09/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	To enhance the student's basic mathematical and scientific concepts in the first stage by helping him understand the curriculum's vocabulary and acquire the skill of solving mathematical problems, including the ideas and practical applications contained in that vocabulary, and employing them in a way that suits the student's engineering specialization.
Module Learning Outcomes	1. Explanation of the concepts of integrals and definite integrals. 2. Focus on and familiarize students with the integration of trigonometric functions and methods for solving them. 3. How to find the area under a curve using integrals. 4. Explanation of the most important series, geometric series, and methods for finding convergence. 5. Definition of the Maclaurin-Tayler series and methods for finding them. 6. Focus on the numerical method for finding definite integrals. 7. Review and explain some special methods for finding integrals. 8. Address the most important applications of definite integrals in volumes. 9. Introduce students to periodic functions, their mathematical meaning, how to graph such functions, and how to find the interval in which these functions repeat.

	10. Focus on how to find the inverse integral of a function. 11. Explanation of how to solve integrals using the trapezoidal method and Simpson's method. 12. Review some general properties of definite integrals. 13. Introduce the student to double integrals and how to solve them. 14. Explain the integration of ordinary, trigonometric, hyperbolic, and inverse functions. 15. Introduce the student to how to find the area under a curve graphically for ordinary, trigonometric, and hyperbolic functions. 16. Introduce the student to the method of integrating raised trigonometric functions. 17. Introduce the student to problems of integrating fractions and rational numbers. 18. Introduce the student to finding the length of a curve and its surface area. 19. Explain how to integrate trigonometric and hyperbolic substitutions. 20. Focus on integration by parts and the table. 21. Apply what the student has learned in the above sections to solve applied geometry problems. Explain the integration of the product of the sine and cosine functions and the tangent function with the secant and cotangent functions with the cosecant.
Indicative Contents	**Indicative content includes the following.**[150] • Integration formulas, including integration of exponential and logarithmic functions, integration of trigonometric and inverse trigonometric functions, and integration of hyperbolic and inverse hyperbolic functions. [12 hours] • Integration methods, including integration by parts, integration by fractional parts, integration of rational functions of trigonometric functions, integration of the product of sine, cosine, and tangent functions with secants and cotangent functions, and the method of integrating sine and cosine functions. [12 hours] • Integration of trigonometric and hyperbolic substitutions, double integrals, geometric applications of definite integrals, geometric applications of volumes using definite integrals, and general substitutions. [46 hours] • Numerical methods of definite integrals. [40 hours] • Geometric series, including Maclaurin and Taylor series. [40 hours]

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

Student Workload (SWL)			
Structured SWL (h/sem)	59	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	116	**Unstructured SWL (h/w)**	8
Total SWL (h/sem)	**175**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	4	10% (10)	5 ,7,10,13	LO #3, #4, #5, and #6

assessment	**Assignment**	15	10% (10)	Continuous	All
	Home work	15	10% (10)	Continuous	LO #3, #5 and #6
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #5- #11
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Indefinite Integrals**
Week 2	**Integrals of functions**
Week 3	**Integrals of other functions**
Week 4	**Methods of Integration**
Week 5	**Integration of Partial fractions and Rational functions**
Week 6	The method of integrating raised trigonometric functions
Week 7	Method of integration of sine and cosine
Week 8	Integration of Trigonometric and Hyperbolic Substitutions
Week 9	Double Integral
Week 10	Engineering Application of definite integrals
Week 11	Engineering Application in Volumes using definite integrals
Week 12	**General Substitutions**
Week 13	Numerical Methode of Definite Integration
Week 14	Geometric series
Week 15	Maclaurin and Tyler series
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	George B. Thomas Jr, Weir Joel R. Hass ‘Calculus’ (V.12), 2014.	Yes
Recommended Texts	Engineering Mathematics, stroud.	Yes
Websites		

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

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

Module Information

Module Title	**Engineering Mechanics (Statics)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**ACR1213**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab	
Module Leader	Bashar Abid Hamza		**e-mail**	met.basher.abid@uobabylon.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date		21/9/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	After completing the course, students should be able to 1. Describe the characteristics and properties of forces and moments, analyze the force system, and obtain the resultant and equivalent force systems, 2. State the conditions of equilibrium, draw free body diagrams (FBDs), analyze and solve problems involving rigid bodies in equilibrium, 3. Draw FBDs, analyze and solve structural and mechanical systems of rigid bodies in equilibrium, 4. Draw FBDs, analyze and solve structural and mechanical systems with distributed loads in equilibrium, 5. Describe the mechanism and characteristics of dry friction, draw FBDs, analyze and solve structural and mechanical systems with friction in equilibrium, 6. Describe the physical meanings of idealized problems in Statics and approximate real-life Situations to idealized problems
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1- To understand Principle engineering mechanics 2- enable student to study and analyze force systems 3- enable student to Modeling of supports and free body diagram 4- enable student to study equilibrium of force systems applied on bodies. 5- enable student to locate the centroid of area. 6- enable student to determine the moment of inertia of area. 7- enable student to analyze and solve structural and mechanical systems with friction in equilibrium.
Indicative Contents	**Indicative content includes the following**. • Introduction, perpendicular components of forces, moment and couple of forces and resultant of force system. **[16hrs.]**

	• Modeling of supports, Draw free body diagram. **[5 hrs.]** • Determination Centroid of lines, area, and volume using integration. **[5 hrs.]** • Determination Centroid of lines, area, and volume using tables. **[3 hrs.]** • Determination moment of inertia using integration. **[3 hrs.]** • Determination moment of inertia using tables. **[3 hrs.]** • Evaluation of friction forces.**[5 hrs.]**

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

Student Workload (SWL)			
Structured SWL (h/sem)	59	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	66	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	2 and 4	LO #1 and #2
	Assignments	2	10% (10)	4 and 8	LO #1 - #5
	Projects / Lab.	1	10% (10)	13	LO #1 and #2
	Report	1	10% (10)	14	LO #1 - #5
Summative assessment	**Midterm Exam**	2hr	10% (10)	4 and 8	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction
Week 2	Force 2D (perpendicular components)
Week 3	Force 2D (moment and couple)
Week 4	Force 2D (resultant)
Week 5	Force 2D (resultant)
Week 6	Equilibrium
Week 7	Equilibrium
Week 8	Centroid lines, area, and volume
Week 9	Centroid lines, area, and volume
Week 10	Centroid lines, area, and volume
Week 11	Moment of inertia
Week 12	Moment of inertia

Week 13	Moment of inertia
Week 14	Friction
Week 15	Friction
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	J. L. Meriam and L. G. Kraige, 'Engineering Mechanics: Statics (V.1), 7th edition, Wiley 2012.	Yes
Recommended Texts	R. C. Hibbeler, Engineering Mechanics: STATICS (SI Edition), 14th edition, Prentice Hall 2016.	No
Websites		

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

Module Information			
Module Title	**Material Science**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**ACR1203**		
ECTS Credits	**4**		
SWL (hr/sem)	100		
Module Level	UGI	**Semester of Delivery**	Two
Administering Department	Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab
Module Leader	Maithem Hussien Rasheed	**e-mail**	met.maithem.hussiem@uobabylon.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	MSC
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	21/09/2025	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1) To study the engineering materials science, and why study engineering materials, and to understand classifications of Engineering Materials. 2) To learn crystal and no crystal structures and unit cell. 3) Study the direction of crystallography and miller indices. 4) Study the atomic packing factors., study the stress – strain curve, young 5) To understand testing of engineering materials, tension, compression, types of hardness methods. to learn metallurgy engineering, phase equilibrium diagram, Fe- C diagram, heat treatments composite materials
Module Learning Outcomes	1. Explain importance of materials in materials science and engineering field. 2. Relate between material and engineering. 3. Classify materials according to their types. 4. Describe basic definition and conception of materials and physical properties of materials. 5. Follow new developments in materials application field. 6. Information about atomic structure, atomic bonds, crystal structure, crystal geometry and crystal defects. 7. Define structure of atoms. 8. Define space lattice, unit cell, crystal systems and Bravais lattice. 9. Calculate unit cells and volumetric, planar and linear density values in unit cell. 10. Describe crystal imperfections. 11. Give information about mechanical properties of materials. 12. Stress- strain curve. 13. Study the different hardness methods experiments and calculations. 14. Give information about metal, polymer, ceramic and composite materials and their properties which used in automobile industry. 15. Study the metallurgy engineering, phase equilibrium diagram, Fe- C diagram, heat treatments.
Indicative Contents	**Indicative content includes the following**. • Introduction of engineering materials science, and why study engineering materials, and to understand classifications of Engineering Materials. Also to learn crystal and no crystal structures and unit cell, and study the direction of crystallography and miller indices. Study the atomic packing factors. [15 hr.] • study the stress – strain curve, young modulus .and to understand testing of engineering materials, tension, compression, types of hardness methods (Brinell, Vickers, Rockwell). Average and standard deviation. [15 hr.] • Study the composite materials (matrix and reinforcement), ceramics materials, metal, polymer, ceramic and composite materials and their properties which used in automobile industry. Study the metallurgy engineering, phase equilibrium diagram, Fe- C diagram, heat treatments. [15 hr.]

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in learn science of engineering materials. and Study engineering material, types, application, Study crystal structure , Study (mechanical properties of materials), and Study polymers ,ceramics ,composites

Student Workload (SWL)

Structured SWL (h/sem)	59	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	41	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	100		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	5 and 10	LO #3, #4, #5, and #6
	Assignment	15	10% (10)	Continuous	All
	Home work	15	10% (10)	Continuous	LO #3, #5 and #6
	Report	2	10% (10)		
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction of material science
Week 2	Classifications of engineering material
Week 3	Crystal and non crystal structures
Week 4	Unit cell and atomic packing factor
Week 5	Direction of crystallography and millier indices
Week 6	Stress – strain curve , young modulus
Week 7	Mechanical properties of engineering material .
Week 8	Tension – compression tests.
Week 9	Hardness test , types of hardness methods.
Week 10	Metallurgy ,metals and alloys , thermal equilibrium diagrams
Week 11	lever rule, applications on binary phase diagrams, Fe-C phase diagram
Week 12	(TTT) Diagrams .
Week 13	Heat treatments of steel.
Week 14	Composite materials
Week 15	Nano-materials, plastics, ceramics and glass.

Delivery Plan Lab. (Weekly Syllabus)	
	Material Covered
Week 1	Introduction
Week 2	Preparing a Sample for Microscopic Examination
Week 3	Test
Week 4	Brinell Hardness Test
Week 5	Test
Week 6	Vickers Hardness Test

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	- Materials Science and Engineering ,william callister, 2014 *Department of Metallurgical Engineering*	Yes
Recommended Texts	-the science and engineering of materials , donald askeland 2005.	Yes
Websites	https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/TEKNOLOGI%20REKAYASA%20MATERIAL%20PERTAHANAN/Materials%20Science%20and%20Engineering%20An%20Introduction%20by%20William%20D.%20Callister,%20Jr.,%20David%20G.%20Rethwish%20(z-lib.org).pdf	

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

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

Module Information					
Module Title	**Arabic**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	UOBAB0301016				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGI		**Semester of Delivery**	Two	
Administering Department	Air-conditioning and Refrigeration Engineering		**College**	College of Engineering\Al-Musayab	
Module Leader	Abdulkhaliq Gali Mahdi		**e-mail**	abdkhaliqmahdi@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name	-		**e-mail**	-	
Scientific Committee Approval Date	21/09/2026		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	-	**Semester**	-
Co-requisites module	-	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Language Proficiency: The primary objective of the Arabic language unit is to help learners develop proficiency in reading, writing, speaking, and listening in Arabic. This includes improving vocabulary, grammar, pronunciation, and comprehension skills. 2. Communication Skills: Another objective is to enhance learners' ability to communicate effectively in Arabic. This involves focusing on the practical use of the language, such as

	engaging in conversations, expressing opinions, asking and answering questions, and participating in various communication activities. 3. Cultural Understanding: The unit's objectives may also aim to promote cultural understanding and awareness of the Arab world. This includes introducing learners to the customs, traditions, literature, history, and social aspects associated with Arabic-speaking countries. 4. Functional Language Use: The unit objectives may aim to equip learners with the language skills necessary to perform specific tasks or functions in Arabic. This may include learning vocabulary and phrases related to topics such as travel, shopping, dining, healthcare, and business interactions. 5. Linguistic Accuracy: The unit's objectives may emphasize the development of grammatical accuracy and proper language usage. This includes learning Arabic grammar rules and structures, sentence construction, and morphology to produce coherent, error-free sentences. 6. Independent Learning: Another objective is to enhance learners' ability to study and explore the Arabic language independently outside the classroom. This may include encouraging self-directed learning, providing resources for further practice, and developing strategies for effective language acquisition. Assessment and Progress: Unit objectives may also aim to assess learners' progress and provide feedback on their Arabic language skills. This allows

Module Learning Outcomes	1. Listening Comprehension: Demonstrating the ability to understand spoken Arabic across a range of topics and contexts, including conversations, presentations, and audio recordings. 2. Reading Comprehension: Demonstrating the ability to read and understand written Arabic texts of varying levels of difficulty, such as articles, stories, and authentic materials, and to extract relevant information. 3. Speaking Proficiency: Communicating effectively in Arabic by expressing ideas, opinions, and information orally. Engaging in conversations, participating in discussions, and giving presentations using appropriate vocabulary, grammar, and pronunciation. 4. Writing Proficiency: Produce written texts in Arabic, such as essays, reports, emails, and letters, with clarity, coherence, and grammatical accuracy. Apply appropriate language conventions, including spelling, punctuation, and paragraph structure. 5. Vocabulary and Grammar: Demonstrate a wide range of vocabulary and an understanding of Arabic grammar rules and structures. Use appropriate vocabulary to accurately express ideas and thoughts, and apply grammatical rules effectively in written and spoken communication. 6. Cultural Awareness: Demonstrate an understanding of the cultural aspects of Arabic-speaking countries, including customs, traditions, and social norms. Recognize and respect cultural differences and apply cultural knowledge appropriately in language use. 7. Language Fluency: Develop fluency in Arabic by speaking and responding spontaneously, without excessive hesitation. Demonstrate the ability to sustain a conversation, negotiate meaning, and handle various communication situations with confidence. 8. Critical Thinking: Apply critical thinking skills to analyze and evaluate Arabic texts, including news articles.
Indicative Contents	The instructional content includes the following: Hour [50] The student should construct a sentence with a subject and a predicate, Subject and Predicate The student should learn about grammatical corrections Grammatical Corrections The student should use punctuation marks Punctuation Marks The student should learn when to pronounce the hamza in "an" with a fathah and when to pronounce it with a kasrah The necessity of opening and closing the hamza The student should become familiar with narrative literature Narrative literature Expanding the student's linguistic vocabulary Arabic literature The student should distinguish between classical and free verse Free verse and classical verse The student should write numbers correctly Numbers The student should translate the life of the poet Hafiz Ibrahim Hafiz Ibrahim

	The student should translate the life of the poet Badr Shaker al-Sayyab Badr Shaker al-Sayyab The student should translate the life of the poet al-Jawahiri al-Jawahiri The student should identify the hamza of separation (hamza al-qat)

Learning and Teaching Strategies	
Strategies	Communicative Approach: Emphasize the use of Arabic for meaningful communication. Encourage learners to engage in authentic conversations, role-plays, and communication activities that reflect real-life situations. Provide opportunities for meaningful interaction in Arabic to develop speaking and listening skills. Integrated Skills: Integrate the four language skills (listening, speaking, reading, and writing) into the teaching and learning process. Create activities that allow learners to practice and reinforce these skills simultaneously. For example, read a text aloud, discuss it, and then write a response. Authentic Materials: Incorporate authentic Arabic materials, such as news articles, literature, songs, videos, and podcasts, into the curriculum. These materials expose learners to real-world language use and cultural aspects of Arabic-speaking communities, enhancing their language proficiency and cultural understanding. Contextual learning: Teach Arabic in meaningful contexts related to learners' lives or areas of interest. Use relevant topics, themes, and situations to make the language learning experience more engaging and authentic for learners. Multimedia Curriculum: Use a variety of resources and media to cater to different learning styles. Combine visual, auditory, and kinesthetic activities to enhance language learning. Integrate multimedia tools, language learning apps, online resources, and interactive activities to create an engaging learning environment. Task-based learning: Organize language learning around meaningful tasks that require learners to use Arabic to achieve specific goals. Tasks can include planning a trip, describing a personal experience, or participating in a discussion. This approach promotes language use and problem-solving skills.

Student Workload (SWL) Calculated over 15 weeks			
Structured SWL per Semester (h/sem)	30	**Structured SWL per Week (h/w)**	2
Unstructured SWL per Semester (h/sem)	20	**Unstructured SWL per Week (h/w)**	1
Total SWL per Semester (h/sem)	**50**		

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

Delivery Plan (Theoretical Weekly Syllabus)	
	Material Covered

Week 1	The student should be able to construct a sentence with a subject and a predicate
Week 2	The student should be able to identify grammatical corrections
Week 3	The student should be able to use punctuation marks
Week 4	The student should be able to identify when to pronounce the hamza as open or closed
Week 5	The student should be familiar with narrative literature
Week 6	Midterm Exam
Week 7	Expand the student's vocabulary
Week 8	The student should be able to distinguish between classical and free verse
Week 9	The student should write numbers correctly
Week 10	The student should translate the life of the poet Hafiz Ibrahim
Week 11	The student should translate the life of the poet Badr Shaker al-Sayyab
Week 12	The student should translate the life of the poet al-Jawahiri
Week 13	The student should identify the hamza of separation
Week 14	The student should use the hamza of connection
Week 15	The student should construct a sentence with a subject and a predicate
Week 16	Final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1- Aliwi, Saad Hassan, *Intermediate Grammar*, 1st ed., Dar Safaa for Publishing and Distribution, Amman, Jordan, 2015. 2- Al-Nahwi, Ibn Aqil, Ibn Aqil's Commentary on Ibn Malik's Al-Fiyah, 1st ed., Dar al-Kutub al-Ilmiyah, Beirut, Lebanon, 2006. Dhaif, Shawqi, History of Arabic Literature, 2nd ed., Dar al-Ma'arif Publishing House, Cairo, 2006.	No
Recommended Texts	A) Al-Ansari, Ibn Hisham, Commentary on *Qatar al-Nada wa Bal al-Sada*, 1st ed., Dar al-Hilal for Publishing and Distribution, Beirut, Lebanon, 2009. Al-Samara'i, Fadel Salih, *Ma'ani al-Nahw*, Dar Ibn Kathir for Publishing and Distribution, Beirut, Lebanon, 2017.	No
Websites	Wikipedia, Arabic Language Forums	

Grading Scheme

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

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

Module Information

Module Title	**Mechanical and electronic systems**			**Module Delivery**
Module Type	Core			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	ACR1204			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	1	**Semester of Delivery**	Two	
Administering Department	**Air Conditioning and Refrigeration Engineering**	**College**	**College of Engineering \AL-Musayib**	
Module Leader	Omar A. Alkawak	**e-mail**	Msb.omar.alkawak@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSC	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date	21/09/2025	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Understand conduction using electron and hole theory. 2. Develop a clear understanding of the basic operation and characteristics of a diode in the no-bias, forward-bias, and reverse-bias regions. 3. Be able to describe the difference between *n* - and *p* -type materials. 4. Understand the concept of load-line analysis and how it is applied to diode networks. 5. Become familiar with the use of equivalent circuits to analyze series, parallel, and series-parallel diode networks. 6. Understand the process of rectification to establish a dc level from a sinusoidal ac input. 7. Become familiar with the basic construction and operation of the Bipolar Junction Transistor. 8. Be able to determine the dc levels for the variety of important BJT configurations. 9. Become familiar with the construction and operating characteristics of Junction Field Effect (JFET), Metal-Oxide Semiconductor FET (MOSFET), and Metal-Semiconductor FET (MESFET) transistors. 10. Be able to perform a dc analysis of JFET, MOSFET, and MESFET networks. 11. Become acquainted with the small-signal ac model for a JFET and MOSFET.

Module Learning Outcomes	1. Understanding of the basic principles and concepts of electronic circuits. 2. Ability to design and analyze electronic circuits using various electronic components. 3. Ability to troubleshoot electronic circuits and identify faults. 4. Knowledge of different types of electronic circuits, such as analog and digital circuits, and their applications. 5. Knowledge of different types of electronic devices, such as transistors, diodes, and operational amplifiers, and their applications in electronic circuits. 6. Understanding of safety measures while working with electronic circuits. 7. Ability to apply the knowledge and skills learned in electronic circuits to create various electronic systems. 8. Development of critical thinking and problem-solving skills. 9. Preparation for pursuing a career in electronics engineering or related fields.
Indicative Contents	**Indicative content includes the following**. ● **Semiconductor diode:** Introduction, semiconductor materials: Ge, Si, AND GaAs, covalent bonding and intrinsic materials, energy levels, n -type and p -type materials, semiconductor diode, diode equivalent circuits, reverse recovery time, diode testing, Zener diodes, light-emitting diodes, ● **Diode Applications:** introduction, load-line analysis, series diode configurations, parallel and series–parallel configurations, and/or gates, sinusoidal inputs; half-wave rectification, full-wave rectification, clippers, clampers, Zener diodes, voltage-multiplier circuits ● **Bipolar Junction Transistors:** introduction**,** transistor construction, transistor operation, Common-Base Configuration, Common-Emitter Configuration, Common-Collector Configuration, Limits of Operation, Transistor Specification Sheet, Transistor Testing, **DC Biasing—BJTs**: Fixed-Bias Configuration, Emitter-Bias Configuration, Voltage-Divider Bias Configuration, Collector Feedback Configuration, Emitter-Follower Configuration, Common-Base Configuration. ● **Field-Effect Transistors**: Construction and Characteristics of JFETs, Transfer Characteristics, Important Relationships, Depletion-Type MOSFET, Enhancement-Type MOSFET, **FET Biasing:** Introduction, Fixed-Bias Configuration, Self-Bias Configuration, Voltage-Divider Biasing, Common-Gate Configuration, Depletion-Type MOSFETs, Enhancement-Type MOSFETs.

Learning and Teaching Strategies	
Strategies	1. The teacher prepares lectures on the subject in soft electronic form and presents them to the students. 2. The teacher gives lectures in detail. 3. the teacher requests periodic reports and homework on the basic subjects. 4. Academic methods and lectures 5. Dialogue modalities 6. Use projectors 7. Providing the student with basic and secondary topics related to advanced electronics. 8. Translating theoretical topics and vocabulary related to electronics devices. 9. Requiring the student to follow developments in electronic devices and their applications.

Student Workload (SWL)			
Structured SWL (h/sem)	45	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	30	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**75**		

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

Delivery Plan (Weekly Syllabus)	
Week	**Material Covered**
Week 1	The PN Junction Diode
Week 2	Diode Switching Circuits
Week 3	Diode Clipping Circuits
Week 4	Diode Clamping Circuits
Week 5	Diode Rectifier Circuits
Week 6	Voltage-Multiplier Circuits
Week 7	Zener Diodes and Applications
Week 8	Bipolar Junction Transistors (BJTs)
Week 9	**Midterm Exam**
Week 10	DC Biasing Circuits of BJTs
Week 11	Bias Stabilization
Week 12	BJT Switching Circuits
Week 13	BJT Modeling and AC Equivalent Circuits
Week 14	Field-Effect Transistors (FETs)
Week 15	DC Biasing Circuits of JFETs
Week 16	**Preparatory week before the final Exam.**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1. Electronic Devices and Circuit Theory, Eleventh Edition ,Robert L. Boylestad and Louis Nashelsky 2. Thomas L. Floyd, Electronic Devices, Sixth Edition.	No
Recommended Texts	1. Robert L. Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, Eleventh Edition 2. Thomas L. Floyd, Electronic Devices, Sixth Edition. 3. Thedore F. Bogart, Electronic Devices and Circuits, Second Edition. 4. Donald A. Neamen, Electronic Circuit Analysis and Design, Second Edition. 5. Jacob Millman and Christos C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, International Student Edition. 6. Adel S. Sedra and Kenneth C. Smith, Microelectronic Circuits, Fifth Edition. 7. Albert P. Malvino, Electronic Principles, Second Edition.	No
Websites		

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

UGII – level
Semester – Three

Module Information					
Module Title	**Thermodynamics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**UOBAB0303033**				
ECTS Credits	**7**				
SWL (hr/sem)	175				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Air-conditioning and Refrigeration Engineering	**College**		College of Engineering\Al-Musayab
Module Leader	Adnan Qahtan Ibrahim Issa		**e-mail**		adnan.issa@uobabylon.edu.iq
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**		E-mail
Peer Reviewer Name	Name		**e-mail**		E-mail
Scientific Committee Approval Date		21/09/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop problem solving skills and understanding types and transformations of energy. 2. To understand types of thermodynamic processes. 3. This course deals with the conversion of heat into energy, aspects of energy and energy transformations.

	4. This is the basic subject for the case under study and describes the impact of thermodynamic processes on the properties of engineering materials.

Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1) Students will define and explain fundamental thermodynamic concepts such as systems, properties, states, processes, and cycles. 2) Students will apply the First Law of Thermodynamics to analyze energy interactions in closed and open systems. 3) Students will apply the Second Law of Thermodynamics to evaluate entropy generation and determine the feasibility and efficiency of thermodynamic processes. 4) Students will analyze thermodynamic cycles (e.g., power and refrigeration cycles) and calculate their performance parameters such as efficiency and coefficient of performance (COP). 5) Students will use thermodynamic property tables, charts, and software tools to determine properties of pure substances and gas mixtures. 6) Students will formulate and solve engineering problems involving mass and energy balances for steady-flow and transient systems. 7) Students will interpret and validate results of thermodynamic analyses and compare them with physical expectations or real-world system behavior.
Indicative Contents	Indicative content includes the following. <u>Part A - Application of Thermodynamics</u> Thermodynamics and Energy Application Areas of Thermodynamics, Forms of Energy Some Physical Insight to Internal Energy Mechanical Energy More on Nuclear Energy, Energy Conversion Efficiencies, Property Diagrams for Phase-Change Processes, The T-v Diagram, The P-v Diagram Extending the Diagrams to Include the Solid Phase, The P-T Diagram The P-v-T Surface. [15 hrs] Property Tables Enthalpy—A Combination Property, Saturated Liquid and Saturated Vapor States 1b Saturated Liquid–Vapor Mixture. Superheated Vapor, Compressed Liquid. [15 hrs] The Ideal-Gas Equation of State Is Water Vapor an Ideal Gas, Compressibility Factor—A Measure of Deviation from Ideal-Gas Behavior, Energy Analysis of Closed Systems. [15 hrs] Moving Boundary Work Polytropic Process, Energy Balance for Closed Systems, Specific Heats, Internal Energy, Enthalpy, and Specific Heats of Ideal Gases Specific Heat Relations of Ideal Gases. Internal Energy, Enthalpy, and Specific Heat of Solids and Liquids Internal Energy Changes Enthalpy Changes. Mass and Energy Analysis of Control Volumes. [15 hrs] Revision problem classes [6 hrs] <u>Part B - Conservation of Mass (Principle Mass Balance for Steady-Flow Processes Special Case: Incompressible Flow, Unsteady-Flow Processes Mass Balance)</u> Fundamentals Flow Work and the Energy of a Flowing Fluid Total Energy of a Flowing Fluid Energy Transport by Mass, Energy Analysis of Steady-Flow Systems Energy Balance, Some Steady-Flow Engineering Devices, Nozzles and Diffusers, Turbines and Compressors, Throttling Valves, Mixing Chambers, Heat Exchangers, Pipe and Duct Flow.[15 hrs] The Second Law of Thermodynamics, Thermal Energy Reservoirs. The Second Law of Thermodynamics: Kelvin–Planck Statement, Refrigerators and Heat Pumps Coefficient of Performance Heat Pumps The Second Law of Thermodynamics: Clausius Statement Equivalence of the Two Statements, Reversible and Irreversible Processes Irreversibilities Internally and Externally Reversible Processes. [15 hrs] The Carnot Cycle The Reversed Carnot Cycle, Entropy A Special Case: Internally Reversible Isothermal Heat Transfer Processes, The Entropy Change of Ideal Gases Constant Specific Heats, Otto Cycle: The Ideal Cycle for Spark-Ignition Engines, Diesel Cycle: The Ideal Cycle for Compression-Ignition Engines

	Brayton Cycle: The Ideal Cycle for Gas-Turbine Engines Development of Gas Turbines Deviation of Actual Gas-Turbine Cycles from Idealized Ones. [15 hrs]

Learning and Teaching Strategies	
Strategies	The objective of this skill is for the student to believe in concrete (student abilities) and to understand when, what and how to think and to improve the ability to think reasonably. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. High thinking skill (the goal of this skill is to teach thinking well before making the decision that determines the student's life).

Student Workload (SWL)			
Structured SWL (h/sem)	117	**Structured SWL (h/w)**	8
Unstructured SWL (h/sem)	58	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**175**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Thermodynamics and Energy Application Areas of Thermodynamics
Week 2	Processes and Cycles The Steady-Flow Process
Week 3	The First Law of Thermodynamics Energy Balance Energy Change of a System
Week 4	Phase-Change Processes of Pure Substances Compressed Liquid and Saturated Liquid Saturated Vapor and Superheated Vapor Saturation
Week 5	The T-v Diagram, The P-v Diagram Extending the Diagrams to Include the Solid Phase, The P-T Diagram, The P-v-T Surface
Week 6	Property Tables Enthalpy- A Combination Property , Saturated Liquid and Saturated Vapor States 1b Saturated Liquid–Vapor Mixture, Superheated Vapor, Compressed Liquid
Week 7	Mid-term Exam + The Ideal-Gas Equation of State Is Water Vapor an Ideal Gas
Week 8	Energy Analysis of Closed Systems, Internal Energy, Enthalpy, and Specific Heats of Ideal Gases Specific Heat Relations of Ideal Gases
Week 9	Mass and Energy Analysis of Control Volumes, Conservation of Mass , Principle Mass Balance for Steady-Flow Processes Special Case: Incompressible Flow
Week 10	Flow Work and the Energy of a Flowing Fluid Total Energy of a Flowing Fluid Energy Transport by Mass
Week 11	Some Steady-Flow Engineering Devices
Week 12	Energy Analysis of Unsteady-Flow Processes Mass Balance, The Second Law of Thermodynamics, Thermal Energy Reservoirs, Reversible and Irreversible Processes
Week 13	The Carnot Principles, Entropy, Rankine cycle
Week 14	Otto Cycle: The Ideal Cycle for Spark-Ignition Engines
Week 15	Diesel Cycle: The Ideal Cycle for Compression-Ignition Engines

Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Determining the volumetric expansion coefficient of liquids
Week 2	Lab 2: Verification of Boyle's law
Week 3	Lab 3: Verification of Charle's law
Week 4	Lab 4: Measurement of the specific heat of a solid sample
Week 5	Lab 5: Converting electrical energy into heat energy – Measuring with a voltmeter and an ammeter (Joule equivalent)

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Thermodynamics An Engineering Approach (Fifth Edition)	Yes
Recommended Texts		
Websites	https://www.coursera.org/search?query=thermodynamics&index=prod_all_launched_products_term_optimization&topic=Physical%20Science%20and%20Engineering	

Group	Grade	Marks %	Definition
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	F – Fail	0 - 44	Considerable amount of work required

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

Module Information				
Module Title	**Arabic**		**Module Delivery**	
Module Type	**B**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	UOBAB0301016			
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	UGII	**Semester of Delivery**	Three	
Administering Department	Air-conditioning and Refrigeration Engineering	**College**	College of Engineering\Al-Musayab	
Module Leader	Abdulkhaliq Gali Mahdi	**e-mail**	abdkhaliqmahdi@uobabylon.edu.iq	

Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	-	**e-mail**	-
Peer Reviewer Name	-	**e-mail**	-
Scientific Committee Approval Date	21/09/2026	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	-	**Semester**	-
Co-requisites module	-	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Language Proficiency: The primary objective of the Arabic language unit is to help learners develop proficiency in reading, writing, speaking, and listening in Arabic. This includes improving vocabulary, grammar, pronunciation, and comprehension skills. 2. Communication Skills: Another objective is to enhance learners' ability to communicate effectively in Arabic. This involves focusing on the practical use of the language, such as engaging in conversations, expressing opinions, asking and answering questions, and participating in various communication activities. 3. Cultural Understanding: The unit's objectives may also aim to promote cultural understanding and awareness of the Arab world. This includes introducing learners to the customs, traditions, literature, history, and social aspects associated with Arabic-speaking countries. 4. Functional Language Use: The unit objectives may aim to equip learners with the language skills necessary to perform specific tasks or functions in Arabic. This may include learning vocabulary and phrases related to topics such as travel, shopping, dining, healthcare, and business interactions. 5. Linguistic Accuracy: The unit's objectives may emphasize the development of grammatical accuracy and proper language usage. This includes learning Arabic grammar rules and structures, sentence construction, and morphology to produce coherent, error-free sentences. 6. Independent Learning: Another objective is to enhance learners' ability to study and explore the Arabic language independently outside the classroom. This may include encouraging self-directed learning, providing resources for further practice, and developing strategies for effective language acquisition. Assessment and Progress: Unit objectives may also aim to assess learners' progress and provide feedback on their Arabic language skills. This allows

Module Learning Outcomes	1. Listening Comprehension: Demonstrating the ability to understand spoken Arabic across a range of topics and contexts, including conversations, presentations, and audio recordings. 2. Reading Comprehension: Demonstrating the ability to read and understand written Arabic texts of varying levels of difficulty, such as articles, stories, and authentic materials, and to extract relevant information. 3. Speaking Proficiency: Communicating effectively in Arabic by expressing ideas, opinions, and information orally. Engaging in conversations, participating in discussions, and giving presentations using appropriate vocabulary, grammar, and pronunciation. 4. Writing Proficiency: Produce written texts in Arabic, such as essays, reports, emails, and letters, with clarity, coherence, and grammatical accuracy. Apply appropriate language conventions, including spelling, punctuation, and paragraph structure. 5. Vocabulary and Grammar: Demonstrate a wide range of vocabulary and an understanding of Arabic grammar rules and structures. Use appropriate vocabulary to accurately express ideas and thoughts, and apply grammatical rules effectively in written and spoken communication.

	6. Cultural Awareness: Demonstrate an understanding of the cultural aspects of Arabic-speaking countries, including customs, traditions, and social norms. Recognize and respect cultural differences and apply cultural knowledge appropriately in language use. 7. Language Fluency: Develop fluency in Arabic by speaking and responding spontaneously, without excessive hesitation. Demonstrate the ability to sustain a conversation, negotiate meaning, and handle various communication situations with confidence. 8. Critical Thinking: Apply critical thinking skills to analyze and evaluate Arabic texts, including news articles.
Indicative Contents	The instructional content includes the following: Hour [50] The student should construct a sentence with a subject and a predicate, Subject and Predicate The student should learn about grammatical corrections Grammatical Corrections The student should use punctuation marks Punctuation Marks The student should learn when to pronounce the hamza in “an” with a fathah and when to pronounce it with a kasrah The necessity of opening and closing the hamza The student should become familiar with narrative literature Narrative literature Expanding the student’s linguistic vocabulary Arabic literature The student should distinguish between classical and free verse Free verse and classical verse The student should write numbers correctly Numbers The student should translate the life of the poet Hafiz Ibrahim Hafiz Ibrahim The student should translate the life of the poet Badr Shaker al-Sayyab Badr Shaker al-Sayyab The student should translate the life of the poet al-Jawahiri al-Jawahiri The student should identify the hamza of separation (hamza al-qat)

Learning and Teaching Strategies	
Strategies	Communicative Approach: Emphasize the use of Arabic for meaningful communication. Encourage learners to engage in authentic conversations, role-plays, and communication activities that reflect real-life situations. Provide opportunities for meaningful interaction in Arabic to develop speaking and listening skills. Integrated Skills: Integrate the four language skills (listening, speaking, reading, and writing) into the teaching and learning process. Create activities that allow learners to practice and reinforce these skills simultaneously. For example, read a text aloud, discuss it, and then write a response. Authentic Materials: Incorporate authentic Arabic materials, such as news articles, literature, songs, videos, and podcasts, into the curriculum. These materials expose learners to real-world language use and cultural aspects of Arabic-speaking communities, enhancing their language proficiency and cultural understanding. Contextual learning: Teach Arabic in meaningful contexts related to learners’ lives or areas of interest. Use relevant topics, themes, and situations to make the language learning experience more engaging and authentic for learners. Multimedia Curriculum: Use a variety of resources and media to cater to different learning styles. Combine visual, auditory, and kinesthetic activities to enhance language learning. Integrate multimedia tools, language learning apps, online resources, and interactive activities to create an engaging learning environment. Task-based learning: Organize language learning around meaningful tasks that require learners to use Arabic to achieve specific goals. Tasks can include planning a trip, describing a personal experience, or participating in a discussion. This approach promotes language use and problem-solving skills.

Student Workload (SWL) Calculated over 15 weeks			
Structured SWL per Semester (h/sem)	30	**Structured SWL per Week (h/w)**	2
Unstructured SWL per Semester (h/sem)	20	**Unstructured SWL per Week (h/w)**	1
Total SWL per Semester (h/sem)	**50**		

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

Delivery Plan (Theoretical Weekly Syllabus)	
	Material Covered
Week 1	The student should be able to construct a sentence with a subject and a predicate
Week 2	The student should be able to identify grammatical corrections
Week 3	The student should be able to use punctuation marks
Week 4	The student should be able to identify when to pronounce the hamza as open or closed
Week 5	The student should be familiar with narrative literature
Week 6	Midterm Exam
Week 7	Expand the student's vocabulary
Week 8	The student should be able to distinguish between classical and free verse
Week 9	The student should write numbers correctly
Week 10	The student should translate the life of the poet Hafiz Ibrahim
Week 11	The student should translate the life of the poet Badr Shaker al-Sayyab
Week 12	The student should translate the life of the poet al-Jawahiri
Week 13	The student should identify the hamza of separation
Week 14	The student should use the hamza of connection
Week 15	The student should construct a sentence with a subject and a predicate
Week 16	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1- Aliwi, Saad Hassan, *Intermediate Grammar*, 1st ed., Dar Safaa for Publishing and Distribution, Amman, Jordan, 2015. 2- Al-Nahwi, Ibn Aqil, Ibn Aqil's Commentary on Ibn Malik's Al-Fiyah, 1st ed., Dar al-Kutub al-Ilmiyah, Beirut, Lebanon, 2006. Dhaif, Shawqi, History of Arabic Literature, 2nd ed., Dar al-Ma'arif Publishing House, Cairo, 2006.	No
Recommended Texts	A) Al-Ansari, Ibn Hisham, Commentary on *Qatar al-Nada wa Bal al-Sada*, 1st ed., Dar al-Hilal for Publishing and Distribution, Beirut, Lebanon, 2009.	No

	Al-Samara'i, Fadel Salih, *Ma'ani al-Nahw*, Dar Ibn Kathir for Publishing and Distribution, Beirut, Lebanon, 2017.	
Websites	Wikipedia, Arabic Language Forums	

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

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

Module Information					
Module Title	Crimes of the Ba'ath Party			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	UOBAB2301				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGI		**Semester of Delivery**	Three	
Administering Department	Energy Engineering		**College**	College of Engineering\Al-Musayab	
Module Leader	Abdulkhaliq Gali Mahdi		**e-mail**	abdkhaliqmahdi@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name	-		**e-mail**	-	
Scientific Committee Approval Date	21/09/2026		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	-	**Semester**	-
Co-requisites module	-	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1- To educate students about the crimes committed by the Ba'ath regime against the Iraqi people. 2- To highlight the psychological and moral consequences of those crimes. 3- To educate students and inform them about the crimes committed by the Ba'ath regime against the Iraqi people. 4- To inform students about the extent to which these crimes violated international laws and norms.

Module Learning Outcomes	1- Students will learn about the general concept of crimes and their classifications. 2- Students will understand and recognize the crimes committed by the Ba'athist regime in Iraq. 3- Students will learn about the negative consequences, tragedies, and calamities that these crimes inflicted upon the Iraqi people, as well as the extent to which they violated international norms and conventions. 4- Raise students' awareness to ensure that such violations are not repeated in the future, and to instill the values of justice and equality. 5- Align these crimes with human rights principles and international principles that prohibit torture and persecution. 6- Distinguish between different types of crimes committed, including genocide, crimes against humanity, and war crimes.
Indicative Contents	The instructional content includes the following: 1- Daily discussions to assess students' understanding of the material and evaluate their daily participation. 2- Daily quizzes with short, varied scientific questions to assess their understanding of the material. 3- Allocating a portion of each semester's grade to homework assignments. 4- Daily quizzes and monthly exams on the curriculum, as well as a final exam.

Learning and Teaching Strategies	
Strategies	The importance of studying the subject of the crimes of the Ba'ath regime in Iraq lies in the fact that it serves as a guide and educational resource through which students can gain insight, understanding, and full awareness of all types of crimes committed against the Iraqi people by the tyrannical Ba'ath clique—especially since students did not live through those events and had no real, in-depth understanding of those and the extent to which they violated internationally recognized laws and norms. All of this is intended to help students grasp the magnitude of the calamities and tragedies that befell the Iraqi people under the Ba'athist regime, as well as the cruelty and brutality inflicted upon them through murder, arrest, torture, and intimidation.

Student Workload (SWL) Calculated over 15 weeks			
Structured SWL per Semester (h/sem)	30	**Structured SWL per Week (h/w)**	2
Unstructured SWL per Semester (h/sem)	20	**Unstructured SWL per Week (h/w)**	1

Total SWL per Semester (h/sem)	50

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 ,10	LO #3, #4, #5, and #6
	Assignments	15	10% (10)	continuous	All
	Projects / Lab.				
	Report	15	10% (10)	continuous	LO #3, #5 and #6
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Theoretical Weekly Syllabus)	
	Material Covered
Week 1	The Concept of Crimes and Their Categories
Week 2	Crimes of the Ba'athist Regime Under the Law of the Iraqi Supreme Criminal Court
Week 3	Types of International Crimes
Week 4	Decisions Issued by the Supreme Criminal Court
Week 5	Psychological Crimes
Week 6	Social Crimes
Week 7	The Ba'athist Regime's Stance on Religion
Week 8	Violations of Iraqi Laws
Week 9	Examples of Human Rights Violations and Crimes Committed by the Authorities
Week 10	Rulings on Political and Military Violations by the Ba'athist Regime
Week 11	Environmental Crimes of the Ba'athist Regime in Iraq
Week 12	Destruction of Cities and Villages (Scorched Earth Policy)
Week 13	Drainage of the Marshes and Clearing of Palm Groves
Week 14	Genocide Mass Graves Committed by the Ba'athist Regime
Week 15	Chronological Classification of Genocide Mass Graves in Iraq
Week 16	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Dr. Hamid Hanoun Khalid, Human Rights	Yes
Recommended Texts	Dr. Fakhri Rashid al-Mahna and Dr. Salah Yassin Daoud, International Organizations, College of Law, University of Mosul.	No
Websites		

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

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

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

Module Information					
Module Title	**Mechanical Drawing I with SolidWorks**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	ACR1101				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level		UGI	**Semester of Delivery**		One
Administering Department		Air Conditioning and Refrigeration Engineering	**College**		College of Engineering \ Al-Musayab
Module Leader	Diaa Hassan Jawad		**e-mail**		dhyai.aljashaami@uobabylon.edu.iq
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		21/09/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1 .To develop students' ability to interpret and produce technical drawings according to international engineering drawing standards (ISO, ANSI, DIN, etc.(. 2 .To provide the fundamental knowledge and skills required for representing mechanical components and assemblies accurately. 3 .To enable students to visualize objects in 2D and 3D, strengthening spatial imagination and geometric reasoning. 4 .To familiarize students with orthographic projections, sectional views, dimensioning, and tolerancing practices used in engineering. 5 .To introduce the principles of geometric construction, freehand sketching, and computer-aided drafting (CAD) tools. 6 .To prepare students to communicate design ideas clearly and effectively through

	standardized engineering drawings. 7 .To promote accuracy, neatness, and professional presentation in technical documentation. 8 .To build a foundation for advanced mechanical design, manufacturing, and analysis courses. 9 .To develop problem-solving skills related to reading, interpreting, and creating detailed machine component drawings. 10 .To strengthen teamwork and project-based learning through drawing assignments and collaborative tasks.

Module Learning Outcomes	:By the end of this module, students should be able to 1 .Understand Standards and Conventions .Apply international drawing standards (ISO, ANSI, DIN, etc.) in technical documentation * .Use appropriate line types, symbols, and notations in mechanical drawings * 2 .Visualization and Sketching .Translate 3D objects into 2D projections and vice versa .Produce freehand sketches of simple machine components with correct proportions 3 .Orthographic and Pictorial Projections .Construct orthographic views (front, top, side) of mechanical components . .Draw isometric and perspective views of simple objects . 4.Sections and Dimensioning . .Generate sectional views to represent hidden features of components .Apply correct methods of dimensioning and tolerancing 5 .Geometric Constructions . .(.Perform standard geometric constructions (tangency, intersections, loci, etc . .Apply principles of descriptive geometry to solve spatial problems . 6. Assembly and Detail Drawings. .Interpret and produce detailed part drawings . .Create assembly drawings showing the relationship between components . 7 .Solid Work Skills . Use computer- Solid Work (Solid-Work) software to produce 2D mechanical drawings. .Apply layer management, blocks, and basic 3D visualization tools 8 .Technical Communication . .Read, interpret, and analyze engineering drawings .Communicate design ideas effectively through accurate technical drawings 9. Professional Practice. .Demonstrate neatness, accuracy, and clarity in presenting drawings 28. Work individually and collaboratively on drawing-related tasks and projects.
Indicative Contents	Indicative content includes the following. • - Introduction to the subject: basics of engineering drawing and the difference between it and free drawing: Engineering drawing, its elements, tools and drawing methods. 2- Introducing students to paper scales and drawing boards, and Free hand drawing (lines, circles, ...etc) 3- Distribute the canvas (frame, table, etc.), Types of lines in engineering drawing, Rules for writing dimensions and measurements and recognizing symbols and their significance, Drawing scales (zoom in and zoom out) 4- Construction and engineering operations: Create and divide angles, Divide circles and draw regular shapes in them .Create connecting lines between arcs and circles. 5- Drawing engineering perspectives, Types of engineering perspectives and its construction from projections. Perspective constructions (drawing 3D solids (isometric perspective) 6- Projection in orthogonal planes, vertical projection methods, Drop geometric shapes. 7- Distribution of projections on the drawing board, Conclusion of the third projection from two projections. 8-Inferring the isometric perspective from projections with dimensions 9- Single simple and complex geometric objects 10- Sectors in engineering drawing, their importance, Cutting, sector, and hatching levels, Types of sectors and their classification. [15 hrs]

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

Student Workload (SWL)			
Structured SWL (h/sem)	75	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	75	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Review
Week 2	Gears:
Week 3	-Classification of gears
Week 4	- Applications
Week 5	- Drawing of spur gear
Week 6	Bevel gear
Week 7	- Drawing of bevel gear
Week 8	computer
Week 9	Using sold work to draw spur gears assembly
Week 10	Fits and tolerances
Week 11	Introduction, Shaft, Hole, Basic size, Limits of size, Deviation, Bilateral limits, Unilateral limits
Week 12	Applications about fitting example and excise
Week 13	Mid-term Exam
Week 14	Tolerance
Week 15	Fundamental deviation of tolerance
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Review
Week 2	Gears: Classification of gears- Applications - -Drawing of spur gear
Week 3	Bevel gear -Drawing of bevel gear
Week 4	computer

	Using sold work to draw spur gears assembly
Week 5	Fits and tolerances Introduction, Shaft, Hole, Basic size, Limits of size, Deviation, Bilateral limits, Unilateral limits
Week 6	Applications about fitting example and excise
Week 7	**Mid-term Exam**
Week 8	Tolerance Fundamental deviation of tolerance The hole-basis system, The shaft-basis system, Designation of a fit, Application of tolerances to dimensions
Week 9	Problems (geometry tolerancing)
Week 10	ASSEMBLY DRAWINGS Introduction to Assembly Drawing Types of assemblies with **Practice** Crane Hook
Week 11	Assembly of components **Practice** Screw jack
Week 12	Working drawings: Detail and assembly drawing Detail drawings Problems (Detail drawings) Practice Fuel Pump
Week 13	Working drawings Problems (working drawings) .Gear Pump
Week 14	Preparatory week before the final Exam
Week 15	final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	MACHINE DRAWING (N D JUNNARKAR)	Yes
Recommended Texts		Yes
Websites		

Group	Grade	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	45 - 49	More work required but credit awarded
	F – Fail	0 - 44	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University			

has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above

Module Information					
Module Title	**Engineering Mathematics**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ACR2311**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGII		**Semester of Delivery**	Three	
Administering Department	Air-conditioning and Refrigeration Engineering		**College**	College of Engineering\Al-Musayab	
Module Leader	Emad Daoud Abboud		**e-mail**	mat.emad.dawood.uo.babylon.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	Ph. D	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name	-		**e-mail**	-	
Scientific Committee Approval Date	21/09/2026		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Mathematics	**Semester**	1
Co-requisites module	Applied Mathematics	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Understanding the basic concepts of calculus, differential equations, and linear algebra. 2. Applying mathematical principles to solve engineering problems. 3. Developing skills in mathematical modeling and simulation. 4. Understanding the role of mathematics in engineering design and analysis. 5. Developing critical thinking and problem-solving skills. 6. Developing effective communication skills in mathematics. 7. Understanding the importance of mathematical accuracy and precision in engineering.
	1. Understanding the concept of vectors and their representation in two and three dimensions. 2. Being able to perform vector operations such as addition, subtraction, scalar multiplication, dot product, and cross product. 3. Understanding the concept of periodic functions and their representation using Fourier series. 4. Learning the techniques to calculate Fourier coefficients and Fourier series.

Module Learning Outcomes	5. Applying Fourier series to solve problems in signal processing, heat transfer, and wave propagation. 6. Understanding the concept of Fourier transform and its applications. 7. Understanding the properties of Fourier transform, such as linearity, time shifting, and frequency shifting 8. Understand the basic concepts and terminology of differential equations. 9. Solve first-order differential equations using various techniques such as separation of variables, integrating factors, and exact equations. 10. Solve second-order differential equations with constant coefficients using various techniques such as characteristic equations and undetermined coefficients. 11. Solve higher-order differential equations and systems of differential equations. 12. Understanding the concept of Laplace transform and its application in solving differential equations. 13. Ability to transform time-domain signals into frequency-domain signals using Laplace transform. 14. Understanding the properties of Laplace transform, such as linearity, time shifting, differentiation, integration, convolution, and initial and final value theorems. 15. Understanding the concepts of sequences and series, including arithmetic and geometric sequences, and the sum of a finite and infinite series. 16. Solving problems involving sequences and series, such as finding the nth term, the sum of the first n terms, and the limit of a sequence.
Indicative Contents	**Indicative content includes the following**. • Circles, parabola, ellipse, hyperbola, rotation, hyperbolic functions, inverse hyperbolic functions. Polar coordinate and parametric equations. Equations of lines and planes, product of three or more vectors, vector function and motion: velocity and acceleration, tangential vectors, curvature and normal vector. [8 hrs] • **Fourier series:** Periodic functions, Fourier series, Euler formulas, even and odd functions (Half–Range expansions), applications in electrical engineering. **Fourier Transform:** Complex exponential form, Fourier Integral, Fourier transforms and inverse, Properties, convolution theorem, power spectral density and convolution signals and linear system applications. [16 hrs] • **Partial Differentiation:** Function of two or more variables, partial derivatives, directional derivative, gradient, divergence, curl, tangent plane and normal line, maxima, minima, saddle point. **Ordinary Differential Equations:** First order (variables separable, homogeneous, linear – Bernoulli and exact, second order (homogeneous and non-homogeneous), higher order differential equations. [20 hrs] • **Laplace Transform:** Unit step function, Gamma function, definition of Laplace transform, properties, inverse of Laplace transform, properties, partial fractions, convolution theorem, integral equation, solution of differential equations using Laplace transform, applications.[12 hrs] • **Sequences and Series:** Sequences (convergence, test of monotone), series (geometric series, nth partial sum, test of convergence, alternating series), power and Taylor's series. [4 hrs]

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

Student Workload (SWL)			
Structured SWL (h/sem)	59	**Structured SWL (h/w)**	4

Unstructured SWL (h/sem)	116	**Unstructured SWL (h/w)**	8
Total SWL (h/sem)	**175**		

Module Evaluation					
		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)	3 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Circles, parabola, ellipse, hyperbola, rotation, hyperbolic functions, inverse hyperbolic functions. Polar coordinate and parametric equations.
Week 2	**Vector Analysis**: Equations of lines and planes, product of three or more vectors, vector function and motion: velocity and acceleration, tangential vectors, curvature and normal vector**.**
Week3& 4	**Fourier series:** Periodic functions, Fourier series, Euler formulas, even and odd functions (Half–Range expansions), applications in electrical engineering.
Week 5&6	**Fourier Transform:** Complex exponential form, Fourier Integral, Fourier transforms and inverse, Properties, convolution theorem, power spectral density and convolution signals and linear system applications.
Week 7&8	**Partial Differentiation:** Function of two or more variables, partial derivatives, directional derivative, gradient, divergence, curl, tangent plane and normal line, maxima, minima, saddle point.
Week 9 & 10& 11	**Ordinary Differential Equations:** First order (variables separable, homogeneous, linear – Bernoulli and exact, second order (homogeneous and non-homogeneous), higher order differential equations
Week 12 &13&14	**Laplace Transform:** Unit step function, Gamma function, definition of Laplace transform, properties, inverse of Laplace transform, properties, partial fractions, convolution theorem, integral equation, solution of differential equations using Laplace transform, applications.
Week 15	**Sequences and Series:** Sequences (convergence, test of monotone), series (geometric series, nth partial sum, test of convergence, alternating series), power and Taylor's series.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	***Advanced Engineering Mathematics (Muhadharaty)***	No
Recommended Texts	Engineering-mathematics-ii-2009-cuppy	No
Websites		

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

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

Module Information					
Module Title	**Fluid Mechanics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ERE2312**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	Three	
Administering Department	Energy Engineering		**College**	College of Engineering\Al-Musayab	
Module Leader	Fouad Abdul Amir Khalaf		**e-mail**	q Msd.fouad.khalaf@uobabylon.edu.i	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	PHD	
Module Tutor			**e-mail**		
Peer Reviewer Name	None		**e-mail**	E-mail	
Scientific Committee Approval Date	21/09/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1) To study the fluid mechanics science. and why study fluid mechanics. and to understand fluid properties. 2) To learn fluid properties. 3) Study the fluid in static condition, pressure of fluid, pressure units and gages. 4) Study the forces acting on bodies immersing and floating in fluids, stability and relative equilibrium of them. 5) To understand testing of fluids, viscosity, type of pressure gauges, hydrostatic pressure measurement, stability of body floating in liquid, proving Bernoulli's equation. 6) To learn fluid in dynamic equations.
Module Learning Outcomes	1. To understand Fluid properties, Newton's law of Viscosity, Kinematic viscosity Bulk Modulus of elasticity, and Surface tension. Describe basic definition and conception of Fluid Statics, Pressure at a point, - Variation of Pressure in a static fluid. 2. Approve Hydrostatic laws, and learn about units and scales of Pressure measurement, and types of Manometers. 3. Calculate Force on plane and curved surfaces. 4. Define buoyant force, and describe Stability of floating and submerged bodies. 5. Understand relative equilibrium (linear acceleration), and relative equilibrium (uniform rotation) 6. Define Fluid flow concepts and Basic Equations. 7. Continuity equation. 8. Euler's equation of motion along streamline. 9. Bernoulli equation. 10. With regard to the practical side, the program aims to familiarize students with experiments related to viscosity measurement and identification of pressure measuring devices in addition to measuring hydrostatic pressure and equilibrium of floating and submerged bodies in fluids.
Indicative Contents	**Indicative content includes the following**. • Introduction of fluid mechanic science, and why study fluid mechanics, and to understand fluid properties. Also to learn static fluid mechanics. [15 hrs]. • Study the Pressure at a point,- Variation of Pressure in a static fluid . Hydrostatic laws, units and scales of Pressure measurement, and types of Manometers. [15 hrs] • Calculate Force on plane and curved surfaces. Buoyant force, and Stability of floating and submerged bodies .Understand relative equilibrium (linear acceleration), and relative equilibrium (uniform rotation). [25 hrs]. • Define Fluid flow concepts and Basic Equations. Continuity equation. Euler's equation of motion along streamline. Bernoulli equation. [20 hrs]

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

Student Workload (SWL)			
Structured SWL (h/sem)	103	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	47	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	**150**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Fluid properties , General definitions, - Newton's law of Viscosity, - Kinematic viscosity
Week 2	Bulk Modulus of elasticity, Surface tension
Week 3	Fluid Statics, Definitions, Pressure at a point, - Variation of Pressure in a static fluid
Week 4	Hydrostatic laws, Units and scales of Pressure measurement
Week 5	Manometers (Pressure Measurement)
Week 6	Force on plane surfaces
Week 7	Force on curved surfaces – (Mid-term Exam)
Week 8	Buoyant force
Week 9	Stability of floating and submerged bodies
Week 10	Relative equilibrium (linear acceleration)
Week 11	Relative equilibrium (uniform rotation)
Week 12	Fluid flow concepts and Basic Equations, Definitions
Week 13	Continuity equation
Week 14	Euler's equation of motion along streamline
Week 15	Bernoulli equation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	None
Week 2	Experiment 1: Measurement of viscosity
Weeks 3-4	None
Week 5	Experiment 2: identifying pressure gauges and manometers
Week 6	Experiment 3: Hydrostatic pressure
Weeks 7-9	None
Week 10	Experiment 4: Metacentric height

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Frank M. White, Fluid Mechanic, fifth edt.,	Yes
Recommended Texts	1- ATextbook of Fluid Mechanics And Hydraulic Machines. Ninth edt. 2010 2- FLUID MECHANICS FOR ENGINEERS , 2011	No
Websites	https://www.infobooks.org/free-pdf-books/engineering/fluid-mechanics/ https://www.academia.edu/20207960/Fluid_Mechanics_Textbook	

Group	**Grade**	**Marks %**	**Definition**

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

UGII – level
Semester – Four

Module Information					
Module Title	**Heat Transfer**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**UOBAB0303046**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Air-conditioning and Refrigeration Engineering	**College**		College of Engineering\Al-Musayab
Module Leader	Adnan Qahtan Ibrahim Issa		**e-mail**		adnan.issa@uobabylon.edu.iq
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**		E-mail
Peer Reviewer Name	Name		**e-mail**		E-mail
Scientific Committee Approval Date		21/09/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	Thermodynamics	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop problem solving skills and understanding the mechanism of heat transfer. 2. To understand different types of thermal energy transfer. 3. This course deals with the basic concept of heat transfer. 4. To analyze the case under study and describe the surrounding circumstances. 5. To put the appropriate solutions to calculate the amount of thermal energy in all engineering applications.

Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 29. The student explains the three modes of heat transfer (conduction, convection, radiation) and differentiates between them in various engineering applications. 30. The student applies fundamental equations (such as Fourier's law, Newton's law of cooling, and Stefan–Boltzmann law) to solve heat transfer problems. 31. The student solves steady-state and transient heat conduction problems using analytical or numerical methods with proper documentation. 32. The student analyzes natural and forced convection systems and calculates heat transfer coefficients using appropriate dimensionless correlations. 33. The student evaluates radiative heat transfer between surfaces using view factors and radiation laws. 34. The student designs a basic heat exchanger and calculates its effectiveness using methods such as LMTD or NTU. 35. The student uses engineering software tools to simulate heat transfer problems and compares results with theoretical solutions.
Indicative Contents	Indicative content includes the following. <u>Part A - Modes of heat transfer</u> Introduction/ Modes of heat transfer/ Thermal conductivity/ Steady state conduction, Extended surface/Thermal contact resistance /Steady state multi Dimension /Introduction/Graphical Analogy and conduction, shape factor. Unsteady state conduction /Introduction/Lumped Heat- Capacity system. [15 hrs] Principle of convection/Introduction /The thermal Boundary layer/The relation between fluid friction and heat transfer, Heat transfer in laminar Tube flow, Heat transfer in Turbulent flow in a tube, Flow across cylinders and spheres/Flow across Tube banks. [10 hrs] Empirical and practical relations for forced convection/Introduction, Empirical Relations for free convection/Free infection from vertical plane sand cylinder. Empirical relations for pipe and Tube flow. [10 hrs] Flow across cylinders and spheres/Flow across Tube banks, Natural Convection Systems/INTRODUCTION/ FREE-CONVECTION HEAT TRANSFER ON A VERTICAL FLAT PLATE /EMPIRICAL RELATIONS FOR FREE CONVECTION FREE CONVECTION FROM VERTICAL PLANES AND CYLINDERS/ FREE CONVECTION FROM HORIZONTAL CYLINDERS/ INCLINED SURFACES/ SPHERES.[12 hrs] Revision problem classes [6 hrs] <u>Part B – RADIATION and Heat Exchangers</u> COMBINED FREE AND FORCED CONVECTION/ Radiation Heat Transfer/ INTRODUCTION/ RADIATION PROPERTIES, Relations between radiation shape factors, HEAT EXCHANGE BETWEEN NONBLACKBODIES/ INFINITE PARALLEL SURFACES, RADIATION SHIELDS/ GAS RADIATION/ SOLAR RADIATION. [10 hrs] Heat Exchangers/ INTRODUCTION/ FOULING FACTORS/ TYPES OF HEAT EXCHANGERS, THE LOG MEAN TEMPERATURE DIFFERENCE/ EFFECTIVENESS-NTU METHOD COMPACT HEAT EXCHANGERS/ ANALYSIS FOR VARIABLE PROPERTIES, Mass Transfer. [10 hrs] Summary and Design Information/ CONDUCTION PROBLEMS/ CONVECTION HEAT-TRANSFER RELATIONS, RADIATION HEAT TRANSFER/ HEAT EXCHANGERS. [15 hrs]

Learning and Teaching Strategies	
Strategies	The objective of this skill is for the student to believe in concrete (student abilities) and to understand when, what and how to think and to improve the ability to think reasonably. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. High thinking skill (the goal of this skill is to teach thinking well

	before making the decision that determines the student's life).

Student Workload (SWL)			
Structured SWL (h/sem)	87	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	38	**Unstructured SWL (h/w)**	2.5
Total SWL (h/sem)	125		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction/ Modes of heat transfer/ Thermal conductivity/ Steady state conduction, Conduction in Plane wall /Radial system/Insulation
Week 2	Overall heat transfer coefficient/Critical thickness of insulation/Heat source systems, Extended surface/Thermal contact resistance /Steady state multi Dimension /Introduction/Graphical Analogy and conduction, shape factor
Week 3	Electrical Analogy for two- dimensional conduction, Unsteady state conduction /Introduction/Lumped Heat- Capacity system, Transient Heat flow in a semi-Infinite slap and cylinder
Week 4	Principle of convection/Introduction /The thermal Boundary layer/The relation between fluid friction and heat transfer, Heat transfer in laminar Tube flow
Week 5	Heat transfer in Turbulent flow in a tube, Flow across cylinders and spheres/Flow across Tube banks
Week 6	Empirical and practical relations for forced convection/Introduction, Empirical Relations for free convection/Free infection from vertical plane sand cylinder
Week 7	Mid-term Exam + Empirical relations for pipe and Tube flow, Flow across cylinders and spheres/Flow across Tube banks
Week 8	Natural Convection Systems/INTRODUCTION/ FREE-CONVECTION HEAT TRANSFER ON A VERTICAL FLAT PLATE /EMPIRICAL RELATIONS FOR FREE CONVECTION, FREE CONVECTION FROM VERTICAL PLANES AND CYLINDERS
Week 9	FREE CONVECTION FROM HORIZONTAL CYLINDERS/ INCLINED SURFACES/ SPHERES, COMBINED FREE AND FORCED CONVECTION
Week 10	Radiation Heat Transfer / RADIATION PROPERTIES Relations between radiation shape factors
Week 11	HEAT EXCHANGE BETWEEN NONBLACKBODIES/ INFINITE PARALLEL SURFACES, Heat Exchangers/ INTRODUCTION/ FOULING FACTORS
Week 12	TYPES OF HEAT EXCHANGERS, THE LOG MEAN TEMPERATURE DIFFERENCE/ EFFECTIVENESS-NTU METHOD
Week 13	Summary and Design Information-CONDUCTION PROBLEMS
Week 14	Summary and Design Information-CONVECTION HEAT-TRANSFER RELATIONS
Week 15	Summary and Design Information- RADIATION HEAT TRANSFER/ HEAT EXCHANGERS
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: CONDUCTION

Week 2	Lab 2: FORCED CONVECTION HEAT-TRANSFER
Week 3	Lab 3: FREE CONVECTION HEAT-TRANSFER
Week 4	Lab 4: Heat transfer in laminar Tube flow
Week 5	Lab 5: Heat transfer in Turbulent flow in a tube
Week 6	Lab 6: Internal Force Convection
Week 7	Lab 7: heat exchanger with different water volume rate

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Holman (Heat Transfer)10th	Yes
Recommended Texts	JOHN WILEY & SONS, INC.(Introduction to Heat Transfer) SIXTH EDITION	No
Websites		

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

Module Information					
Module Title	**Strength of Martials**			**Module Delivery**	
Module Type	**core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**UOBAB0303045**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Air conditioning and Refrigeration		**College**	College of Engineering \ Al-Musayab	
Module Leader	Bashar Abid Hamza		**e-mail**	met.basher.abid@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Engineering Mechanics	**Semester**	2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	After completing the course, students should be able to 1. Introducing the concept of strength of materials. 2. learning the principles of stress and the associated strain 3. Studying the different types of deformations

Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. reviewing some of the important principles of statics 2. introducing the concepts of normal and shear stress and the associated strain 3. discussing the relation between stress and strain for materials that are commonly used in engineering 4. learning how to determine deformation of members subjected to axial loading with and without change in temperature 5. discussing the stress and deformation of shafts or tubes that are subjected to torsion 6. establishing the shear and moment diagrams in beam under bending then computing the stresses and the associated deformation 7. reviewing and combining stresses learned previously and finding the state of stress 8. showing how to transfer the state of stress into coordinate associated with different orientation 9. computing the deformation (deflection and slope) of beams

Indicative Contents	Part 1: structured SWL • Simple Stress: normal stress, shear stress, shear stress equilibrium, bearing stress, allowable stresses (11 h) • stress strain relations : normal strain, shear strain, , normal stress strain diagram, hooks law, Poisson ratio, shear stress strain diagram (5 h) • Axial loading: deformation of axial members, statically indeterminate axial loaded members, thermal stresses. (5 h) • Torsion: shear stress in circular shafts, angle of twist, statically indeterminate torque loaded members. (5h) • Shear and moment diagrams: equation method of establishing shear force and bending moment diagrams for beams, graphical method of constructing shear and moment diagrams (5 h) • Stresses in beams: bending stress, transvers shear stress (11 h) • combined loading: thin walled vessels, cylindrical vessels, spherical vessels, combined loading in members (11 h) • Stress transformation: equation method of stress transformation, Mohr's circle (11 h) • Deflection in beams: integration method, moment area method (11 h) Part 2: unstructured SWL • problem solving assignments: 10 assignment each contains 3 types of problems (fundamental problems, actual problem, conceptual problems) (50 h) • project problem: selecting, investigating , analysis, and reporting a problem related stress and strain analysis of engineering materials (21 h including 3 h seminar)

Learning and Teaching Strategies	
Strategies	The main strategy to deliver this module is by encouraging the students to actively participate in solving homework, prepare and take quizzes, and attend discussion groups. This strategy, besides understanding the material, will enhance the student critical thinking.

Student Workload (SWL)			
Structured SWL (h/sem)	73	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	52	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	150		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction, normal stress
Week 2	Shear stress, bearing stress, allowable stress
Week 3	Strain, stress strain relations

Week 4	Axial loading, thermal stress
Week 5	Torsion, angle of twist
Week 6	Shear force and bending moment diagrams
Week 7	Shear force and bending moment diagrams
Week 8	Bending stress in beams
Week 9	Midterm Exam
Week 10	Shear stress in beams
Week 11	Thin walled vessels
Week 12	Combined loading
Week 13	Combined loading
Week 14	Stress transformation 1
Week 15	Stress transformation 2
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: tension test
Week 2	Lab 2: compression test
Week 3	Lab 3: stress strain relation
Week 4	Lab 4: single vs. double shear
Week 5	Lab 5: torsion test
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Mechanics of Materials By R. C. Hibbeler	Yes
Recommended Texts	Strength of Materials By Pytel and SingeR	No
Websites		

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

Module Information		
Module Title	**Computer II**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial**
Module Code	UOBAB2004	
ECTS Credits	3	

SWL (hr/sem)	75		☒ **Practical** ☐ **Seminar**

Module Level	UGII	**Semester of Delivery**	Four
Administering Department	Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab
Module Leader	Salam Hadi Hussein	**e-mail**	met.salam.hadi@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Salam Hadi Hussein	**e-mail**	met.salam.hadi@uobabylon.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	62/06/2022	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Develop proficiency in using operating systems and office software suites: Master the use of operating systems (such as Windows) and professional software (Microsoft Office) to produce well-organized engineering reports, technical presentations, and formal documents. 2. Mastering the analysis of engineering data using spreadsheet software: Developing advanced skills in using Excel to perform complex thermodynamic calculations, manage datasets, and create professional plots of pressure-temperature (P-T) relationships. 3. Laying the foundations of programming logic and algorithmic thinking: Building a strong logical framework by learning a programming language (such as Python or C++) to automate heat transfer and fluid flow equation calculations. 4. Introduction to the Fundamentals of Computer-Aided Design (CAD): Provide students with basic knowledge of CAD software environments to prepare them for the digital drafting of mechanical components and refrigeration cycle diagrams. 5. Understanding computer architecture from an engineering perspective: Developing a technical understanding of hardware components and system requirements necessary to run heavy engineering simulation and modeling software. 6. Develop technical research and communication skills: Enable students to effectively use the internet and digital libraries to retrieve international engineering standards, psychrometric data, and tables of cooling medium properties. 7. Applying computational methods to solve engineering problems: Developing the ability to translate physical engineering problems—such as cooling load calculations—into organized algorithms and flowcharts. 8. Fostering collaborative engineering work and a digital culture: Promote collaborative and leadership behaviors through group software projects and digital file-sharing environments.

	9. Adherence to professional and ethical standards in computing: raising awareness of cybersecurity, software licensing, and the ethical management of digital engineering data.

Module Learning Outcomes	1. Identify and explain the hardware and software components of a computer system required for high-performance engineering applications. 2. Demonstrate a clear understanding of file management, data security, and cloud collaboration tools necessary for engineering projects. 3. Prepare professional technical reports and documents using word processing software, adhering to engineering formatting standards. Create advanced spreadsheets to automate repetitive engineering calculations, using built-in functions, logical operations, and data validation 4 Demonstrate an understanding of the Fortran language syntax, program structure, and programming standards 4. Use appropriate data types (integer, real, character) and constants for engineering variables. 5. Formulate and implement mathematical expressions to solve mathematical relationships. 6. Use arrays to store and process large sets of engineering data or arrays.
Indicative Contents	The instructional content includes the following: [50] hours [1. Introduction to Computing and Operating Systems [10] hours [• Hardware and Software Fundamentals: Understanding system architecture relevant to engineering workstations. • File Management and Data Security: Organizing engineering projects, cloud collaboration, and backup protocols. • Environment Setup: Configuring specialized software environments for thermal analysis and fluid dynamics. .2 Technical Documentation and Office Productivity 10] hours [• Advanced Engineering Reports: Using word processing for technical specifications and project documentation. • Spreadsheet Modeling (Excel): Using formulas and functions to perform humidity calculations, cooling load estimates, and pipe sizing. • Data Visualization: Creating professional charts and graphs to analyze system performance. 3. Engineering Programming and Logic [10] hours [• Algorithms and Flowcharts: Developing logical steps for automated climate control systems. • Introduction to Programming (e.g., Python or MATLAB): Write scripts to solve thermal dynamics equations and optimize HVAC systems. • Numerical Methods: Use software to solve complex engineering problems that cannot be

	solved manually. 4. Database and Network Management [10] hours [• Building Information Modeling Integration: Understanding how data flows between different engineering disciplines. • The Internet of Things in HVAC Systems: An introduction to smart sensors, remote monitoring, and networked building management systems. • Database Fundamentals: Managing equipment inventories and maintenance schedules. Specialized simulation software for heating, ventilation, and air conditioning systems [10] hours [• Load calculation software: Training on industry-standard tools (such as HAP, Elite, or TRACE 700). • Introduction to Computational Fluid Dynamics: Basic concepts of airflow and temperature distribution in enclosed spaces. • System selection tools: Use of manufacturer software to select chillers, air handling units, and cooling towers.

Learning and Teaching Strategies	
Strategies	The main strategy to be followed in teaching this unit is to encourage students to participate in exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classroom sessions and interactive lessons, as well as simple experiments that include sampling activities designed to engage students.

Student Workload (SWL)			
Structured SWL (h/sem)	44	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	31	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**75**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	#3, #4, #5, #6
	Assignment	15	10% (10)	Continuous	All
	Projects / Lab.	1	10% (10)	13	All
	Report	15	10% (10)	Continuous	#3, #5 ,#6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	#1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to Programming in FORTRAN 90 and 95: Differences Between FORTRAN and Other

	Programming Languages (BASIC, C, C++, Pascal, MATLAB)
Week 2	Flowcharts and Algorithms
Week 3	Built-in Functions and Data Types
Week 4	Input and Output Statements
Week 5	Fortran language specifications and commands
Week 6	Logical and conditional statements (IF – ELSEIF – THEN)
Week 7	Creating loops
Week 8	Subroutines
Week 9	File operations (opening and closing files, exporting, importing, and formatting data)
Week 10	External mathematical functions and the computer representation of sequences
Week 11	Arrays, sequences, and some engineering applications
Week 12	Function plotting, graphing software, and drawing geometric shapes
Week 13	Linking computer programs to perform sequential tasks
Week 14	Various computer applications + practical exam
Week 15	Midterm exam for the course
Week 16	

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Understanding the graphical interfaces of the Fortran processor and familiarizing oneself with the main and submenus of the application
Week 2	Constants, variables, and symbols, and their various types
Week 3	Input commands and formatting output
Week 4	Input commands, opening files, and importing and exporting data in various formats
Week 5	Various exercises on direct and simplified programs in mathematical applications
Week 6	Logical and conditional commands and their various applications
Week 7	Internal and external counters and their various applications
Week 8	Diagrams and algorithms in programming
Week 9	Representation of sequences and internal and external mathematical functions
Week 10	Matrices and their representation in engineering applications
Week 11	Plotting mathematical functions and various graphs
Week 12	Subroutines and their various applications
Week 13	Optional factors
Week 14	Various applications
Week 15	Practical exams in the lab

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1. 2020 Modern Fortran: Building Efficient Parallel Applications 2. 2018 Introduction to Modern Fortran: Integrating Fortran	Yes
Recommended Texts	1. 2018 Fourth Session - Introduction to Programming in Fortran 2. 2017 Fortran for Scientists and Engineers	Yes
Websites		

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

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

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

Module Information					
Module Title	**Engineering Mathematics II**			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	**ACR2415**			☐ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGII		**Semester of Delivery**	Four	
Administering Department	Air-conditioning and Refrigeration Engineering		**College**	College of Engineering\Al-Musayab	
Module Leader	Emad Daoud Abboud		**e-mail**	mat.emad.dawood.uo.babylon.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	PhD	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name	-		**e-mail**	-	
Scientific Committee Approval Date	21/09/2026		**Version Number**	1	

Relation with other Modules			
Prerequisite module	Engineering Mathematics I	**Semester**	**three**
Co-requisites module	-	**Semester**	**-**

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	8. Understanding the basic concepts of calculus, differential equations, and linear algebra. 9. Applying mathematical principles to solve engineering problems. 10. Developing skills in mathematical modeling and simulation. 11. Understanding the role of mathematics in engineering design and analysis. 12. Developing critical thinking and problem-solving skills. 13. Developing effective communication skills in mathematics.

	14. Understanding the importance of mathematical accuracy and precision in engineering.

Module Learning Outcomes	17. Understanding the concept of vectors and their representation in two and three dimensions. 18. Being able to perform vector operations such as addition, subtraction, scalar multiplication, dot product, and cross product. 19. Understanding the concept of periodic functions and their representation using Fourier series. 20. Learning the techniques to calculate Fourier coefficients and Fourier series. 21. Applying Fourier series to solve problems in signal processing, heat transfer, and wave propagation. 22. Understanding the concept of Fourier transform and its applications. 23. Understanding the properties of Fourier transform, such as linearity, time shifting, and frequency shifting 24. Understand the basic concepts and terminology of differential equations. 25. Solve first-order differential equations using various techniques such as separation of variables, integrating factors, and exact equations. 26. Solve second-order differential equations with constant coefficients using various techniques such as characteristic equations and undetermined coefficients. 27. Solve higher-order differential equations and systems of differential equations. 28. Understanding the concept of Laplace transform and its application in solving differential equations. 29. Ability to transform time-domain signals into frequency-domain signals using Laplace transform. 30. Understanding the properties of Laplace transform, such as linearity, time shifting, differentiation, integration, convolution, and initial and final value theorems. 31. Understanding the concepts of sequences and series, including arithmetic and geometric sequences, and the sum of a finite and infinite series. 32. Solving problems involving sequences and series, such as finding the nth term, the sum of the first n terms, and the limit of a sequence.
Indicative Contents	**Indicative content includes the following**. • Circles, parabola, ellipse, hyperbola, rotation, hyperbolic functions, inverse hyperbolic functions. Polar coordinate and parametric equations. Equations of lines and planes, product of three or more vectors, vector function and motion: velocity and acceleration, tangential vectors, curvature and normal vector. [8 hrs] • **Fourier series:** Periodic functions, Fourier series, Euler formulas, even and odd functions (Half–Range expansions), applications in electrical engineering. **Fourier Transform:** Complex exponential form, Fourier Integral, Fourier transforms and inverse, Properties, convolution theorem, power spectral density and convolution signals and linear system applications. [16 hrs] • **Partial Differentiation:** Function of two or more variables, partial derivatives, directional derivative, gradient, divergence, curl, tangent plane and normal line, maxima, minima, saddle point. **Ordinary Differential Equations:** First order (variables separable, homogeneous, linear – Bernoulli and exact, second order (homogeneous and non-homogeneous), higher order differential equations. [20 hrs] • **Laplace Transform:** Unit step function, Gamma function, definition of Laplace transform, properties, inverse of Laplace transform, properties, partial fractions, convolution theorem, integral equation, solution of differential equations using Laplace transform, applications.[12 hrs] • **Sequences and Series:** Sequences (convergence, test of monotone), series (geometric series, nth partial sum, test of convergence, alternating series), power and Taylor's series. [4 hrs]

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical

	thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	45	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	55	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**100**		

Module Evaluation					
		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)	3 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Circles, parabola, ellipse, hyperbola, rotation, hyperbolic functions, inverse hyperbolic functions. Polar coordinate and parametric equations.
Week 2	**Vector Analysis**: Equations of lines and planes, product of three or more vectors, vector function and motion: velocity and acceleration, tangential vectors, curvature and normal vector**.**
Week3& 4	**Fourier series:** Periodic functions, Fourier series, Euler formulas, even and odd functions (Half–Range expansions), applications in electrical engineering.
Week 5&6	**Fourier Transform:** Complex exponential form, Fourier Integral, Fourier transforms and inverse, Properties, convolution theorem, power spectral density and convolution signals and linear system applications.
Week 7&8	**Partial Differentiation:** Function of two or more variables, partial derivatives, directional derivative, gradient, divergence, curl, tangent plane and normal line, maxima, minima, saddle point.
Week 9 & 10& 11	**Ordinary Differential Equations:** First order (variables separable, homogeneous, linear – Bernoulli and exact, second order (homogeneous and non-homogeneous), higher order differential equations
Week 12 &13&14	**Laplace Transform:** Unit step function, Gamma function, definition of Laplace transform, properties, inverse of Laplace transform, properties, partial fractions, convolution theorem, integral equation, solution of differential equations using Laplace transform, applications.
Week 15	**Sequences and Series:** Sequences (convergence, test of monotone), series (geometric series, nth partial sum, test of convergence, alternating series), power and Taylor's series.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts		-

Recommended Texts	-	-
Websites		

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

Module Information

Module Title	English Language I	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**UOBABb1101**		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGII	**Semester of Delivery**	Four
Administering Department	Air Conditioning and Refrigeration Engineering	**College**	College of Engineering \ Al-Musayab
Module Leader	Rasul Daoud Salman	**e-mail**	met.rusul.dawood@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	MSC
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	62/06/2022	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. Developing reading, writing, speaking, and listening skills.

	2. Providing an overview of theoretical perspectives on student learning and development. 3. Providing an overview of a variety of important issues in the English language that help students communicate easily with others. 4. Applying theoretical concepts to provide students with opportunities to practice the language and encourage them to speak with native speakers. 5. Equipping students with the ability to express their opinions and participate in discussions. 6. Using a variety of digital devices and tools to interpret and construct meaning.

Module Learning Outcomes	1) The ability to understand language usage in the context of specific purposes. 2) Identifying the most important everyday expressions that can be applied in real life. 3) Developing evidence-based arguments. 4) Educating students on the correct use of English grammar in writing and speaking. 5) Improving students' English language skills in terms of fluency and clarity. 6) Students will give oral presentations and receive feedback on their performance. 7) Improving students' reading skills through extensive reading. 8) Equipping students with a large vocabulary. 9) Apply grammatical rules in communicative contexts such as: classroom activities, reading and writing, and homework assignments. 10) Enhance students' ability to write essays and academic papers. 11) Improve students' proficiency in four key areas: writing, speaking, reading, and listening.
Indicative Contents	The instructional content includes the following: • Focus on four key aspects of the English language: writing, speaking, reading, and listening [5 hours] • Understanding the general topic or main idea, key points, important facts and details, vocabulary in context, and pronoun references [5 hours] • Grasping the main idea, key points, and important details related to the main idea [5 hours] • Students must be able to speak successfully both inside and outside the classroom [5 hours] Part B – Analog Electronics Basics • Identify tenses, choose the correct form, and arrange sentences in the correct order [10 hours]

	• Cover aspects such as phonetics, semantics, and pragmatics [10 hours] • Explore the basic components of language, understand language at a deeper level, and learn how to construct words and sentences so that others can understand them. [10 hours]

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

Student Workload (SWL)			
Structured SWL (h/sem)	31	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	19	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	50		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	20% (20)	5 ,13,15	#1, #2 , #10, #11
	Assignment	2	10% (10)	2 , 12	#3, #4 , #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	#5, #8 ,#10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction – Providing general information about the English language
Week 2	Speaking (Multiple Choice) – Asking for general opinions on potential issues
Week 3	Speaking (Campus Announcements and General Conversation) – Presenting the speaker's opinion and explaining the reasons behind it
Week 4	Integrated Speaking (Academic Reading and Lecture) – Explaining academic topics and describing their main points.
Week 5	Listening to an engineering conversation to acquire a broad vocabulary
Week 6	Listening to various videos related to engineering fields such as: (mechanical engineering, electrical engineering, and renewable energy).
Week 7	Midterm exam
Week 8	Writing (teaching students how to write essays in the field of engineering)
Week 9	Writing (enabling students to write their opinions on a general academic topic or to write about a specific engineering topic).
Week 10	Speaking (Have students summarize the main points of a lecture that was previously delivered)
Week 11	Speaking (Increase the student's ability to speak fluently and improve their fluency)
Week 12	Listening (Encourage the student to draw conclusions from what they have heard)
Week 13	Listening (Ask the student what the speaker means in their speech)
Week 14	Writing (Ask the student to write down the key information in the highlighted sentences in the paragraph and rephrase those sentences)
Week 15	Writing (Encourage the student to identify the most important issues in the paragraph)
Week 16	The preparatory week before the final exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	TOEFL Practice Online The official practice test that can help you go anywhere	No
Recommended Texts	The Cambridge Encyclopedia of the English Language By David Crystal	No
Websites	https://www.cambridge.org./	

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