

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**



Academic Program and Course Description Guide

2026

Introduction:

The Chemical Engineering Department at Babylon University creates an inspiring education and research environment for students, faculty, and staff to expand knowledge and improve life through research and engineering education innovation. It acts as a “living laboratory” that successfully prepares tomorrow's forward-thinking leaders with the experience needed to succeed

The chemical engineering curriculum at Babylon University provides a strong foundation in the fundamental principles of chemistry, physics, mathematics, and engineering. You will gain in-depth knowledge of thermodynamics, reaction kinetics, mass and heat transfer, fluid mechanics, process control, and chemical plant design.

This program emphasizes both theoretical and practical aspects of the field. The students will not only learn the essential concepts but also have the opportunity to apply them through laboratory experiments, computer simulations, and design projects.

In conclusion, this guide serves as a comprehensive resource for prospective Chemical Engineering students at Babylon University. We encourage further exploration of the curriculum, faculty profiles, and career opportunities to discover how a Chemical Engineering degree can empower you to make a global impact.

Concepts and terminology:

Academic program Description

The Chemical Engineering program at Babylon University equips students to design, develop, and optimize processes for transforming raw materials. The rigorous curriculum emphasizes both theory (chemistry, physics, mathematics, engineering) and practical application (labs, simulations, design projects) in areas like thermodynamics, reaction kinetics, mass & heat transfer, and process control. Graduates are prepared for careers in diverse industries like oil & gas, pharmaceuticals, and environmental engineering, with strong technical skills and a problem-solving approach.

Course discription

The Chemical Engineering program at Babylon University equips students to design, develop, and optimize processes for transforming raw materials. The rigorous curriculum emphasizes both theory (chemistry, physics, mathematics, engineering) and practical application (labs, simulations, design projects) in areas like thermodynamics, reaction kinetics, mass & heat transfer, and process control. Graduates are prepared for careers in diverse industries like oil & gas, pharmaceuticals, and environmental engineering, with strong technical skills and a problem-solving approach.

Program vision

The Chemical department decided to carry out a process of self-assessment using the format adopted by the University of Babylon. This is the Draft report of the self-assessment. The material for this assessment was gathered according to the

Self-Assessment Criterion adopted by the Ministry of Higher Education. A Department Project Team (DPT) supervised and coordinated the preparation of this material.

Program Mission

The department can point out the following points:

Prepare students to graduate as engineers with strong chemical, scientific, and professional skills in chemical engineering that responds to the community's needs and focuses on analysis and decision-making.

1. Activate postgraduate studies.
2. Participate in scientific activities through updated research and taking part in symposiums and conferences.
3. Playing a leading role in improving public services with regard to the industry sector through scientific consultations to state institutions and private sector.
4. Encouraging graduate engineers to working in team in practical fields at researches and projects.

Program objective

1. Improve and maintain academic standards.
2. Enhance students learning.
3. Verify that the existing programs meet their objectives and institutional goals.
4. Provide feedback for quality assurance of department programs.
5. Prepare the department program for accreditation.

Curriculum objective

Even though the department does not have a formal written strategic plan for the achievement of its objectives, it carries a number of steps to address these objectives.

1. The CE department strives to recruit and retain excellent faculty members who have received very high academic training from well-recognized universities and institutions in the Middle East.
2. The faculty has strengths in heat and mass transfer, Process instrumentation and control, corrosion control, reaction engineering, environment protection, oil and gas, process safety and risk management and Nano-technology.
3. Young faculty members, in different specializations, are continuously recruited to complement the faculty.
4. The department fosters the faculty development through sabbatical leave of study, attendance of professional and scientific meetings.
5. Close cooperation in teaching and research with faculty in material engineering, petroleum engineering and other related departments is very common and is strongly encouraged.
6. In its endeavor to produce graduates who are able to practice Chemical engineering, the CE department adopts an up-to-date curriculum.
7. Up-to-date textbooks support the curriculum. Supplementary and additional material is also used if warranted.
8. Faculty members use Web-based software for course management. This is done through the support of college and university.
9. The department is currently undertaking a major revision of the undergraduate program. The revision has taken into consideration input from alumni, and employers.

10. The University library is centrally located within the campus. The current collection for Chemical Engineering is about 1500 books.

Learning outcomes

Table 1.1 shows the outcomes that are aligned with each objective. For example, to produce graduates who are able to practice chemical engineering a number of skills, or an outcome is required. Such graduates should have the ability to apply knowledge of mathematics and science (a), to design experiments (b), to solve chemical engineering problems (c), to understand professional responsibilities (e), to analyze and design complex plants (j) and to recognize the relationship between society and chemical engineering. These abilities are realized through the introduction of well-structured courses by highly qualified faculty.

Table 1.1 Outcomes versus objectives

Outcomes/Objectives	1	2	3	4	5
A	√	√		√	
B	√	√		√	√
C	√	√	√		
D		√	√	√	√
E	√	√		√	
F			√		√
G			√	√	√
H			√	√	
I		√			√
J	√		√	√	
K	√	√		√	

Teaching and learning strategies

Students and instructors should jointly develop the content and teaching strategies. Students should actively participate and decide in the process of learning. The classroom should provide experiences that students are going to encounter in the workplace. Empowering the students and engaging them in the learning process is the goal and path to life-long learning.

Academic Program Description Form

University Name: university of Babylon
Faculty/Institute: college of engineering
Scientific Department: chemical engineering
Academic or Professional Program Name: B.Sc. chemical engineering
Final Certificate Name: Bachelor of Science in Chemical Engineering
Academic System: course
Description Preparation Date:
Completion Date: 7-4-2026

Signature:

Head of Department Name:

Asist. Prof Dr. Muataz
mohammed salman

Date:

Signature:

Scientific Associate Name: Date:

Prof Dr. Ali Hasson Nahab

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean



1. Program Vision

The department seeks to achieve scientific specificity by enriching the students studying in it with practical and applied capabilities and experiences that extend to the nature of the University of Babylon.

2. Program Mission

Each program must have a mission, quantifiable, measurable objectives and expected outcomes for graduates. The outcomes include competency and tasks graduates are expected to perform after completing the program. A strategic plan must be in place to achieve the program objectives. The extent to which these objectives are achieved through continuous assessment and improvements must be demonstrated.

3. Program Objectives

The Chemical Engineering program has been carefully prepared for students for the profession of chemical engineering through study, experience, and practice to:

- a. To prepare engineers with basic scientific and chemical knowledge.
- b. To allow graduates to design factories related to the chemical, petroleum, petrochemical, and food industries.
- c. To prepare graduates to operate and manage the chemical factories by concentrating on the theoretical and practical side.
- d. To enrich the learning process with the high studies curriculum and applied scientific research, stressing its role in serving society and solving its problems.

4. Program Accreditation

Accreditation Board for Engineering and Technology (ABET)

5. Other external influences

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6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution requirements	8	120-150		
College requirements	8	120-150		
Department Requirements	8	120-150		
Summer Training				
Other				

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
Year 1	UOBAB0104011	Computer Science	theoretical	practical
	UOBAB0104012	Mathematics I		
	UOBAB0104013	Chemical Engineering Principles I		
	UOBAB0104014	Analytical Chemistry		
	UOBAB0104015	Engineering Drawing and AUTO CAD		
	UOBAB0104016	Arabic language		
	UOBAB0104021	Mathematics II		
	UOBAB0104022	Chemical Engineering Principles II		
	UOBAB0104023	Engineering Statistics		
	UOBAB0104024	Organic Chemistry		
	UOBAB0104025	Engineering		

		Mechanics and strength of Materials		
	UOBAB0104026	Human rights , freedom and democracy		
Year 2		Programing Engineering language1		
		Engineering Statistics		
		Engineering Materials		
		Industrial Safety		
		Mathematics III		
		Mathematics IV		
		Fluid Flow I		
		Fluid Flow II		
		Properties of petroleum and natural gas		
Year 3		Electrochemical Engineering		
		Thermodynamics 1		
		Thermodynamics 2		
		Engineering analysis		
		Heat transfer I		
		Corrosion engineering		
		Mass Transfer-I		
		Mass Transfer-II		
		Reactor design		
		petroleum refinery engineering		
	Renewable Energy Resources			
Year 4		Unit Operation		
		Nanotechnology		
		Process Control I		
		Process Control II		
		Chemical Industries		
		petrochemical Industries		
		Pollution		

		Gas processing		
		equipment design1		
		equipment design11		
		Catalyst		

8. Expected learning outcomes of the program	
Knowledge	
A1.	Bachelor's graduates have general knowledge of the foundations and history of mathematics, natural sciences and technology, in particular those of their own discipline
A2.	Bachelor's graduates have mastered the basic concepts of their own discipline to a certain extent and are familiar with the interrelationships of these concepts within their own discipline as well as with other disciplines
A3.	. Bachelor's graduates have in-depth knowledge of several current topics within their own discipline.
A4.	Bachelor's graduates are familiar with the quantitative character of the fields of mathematics and natural sciences and have an understanding of the methods used in these fields, and particularly within their own discipline, including computer-aided methods.
Skills	
B1.	(Research) Bachelor's graduates are able to draw up research questions, design, plan and conduct research and report on it independently with a certain degree of supervision. Bachelor's graduates are able to evaluate the value and limitations of their research and assess its applicability outside their own field.
B2.	(Designing) bachelor's graduates are able to translate a problem, in particular a design problem, into a plan of approach and – taking into account the requirements of the client and/or technical preconditions – find a solution.
B3.	(Gathering information) bachelor's graduates are able to gather relevant information using modern means of communication and to critically interpret this information.

B4.	(Collaborating) bachelor's graduates are able to collaborate in teams (including multidisciplinary teams) on technical-scientific problems.
Ethics	
C1,	knowledge of the most important fields of i) process. technology: physical transport phenomena, chemical reactor separation methods, and engineering process design, ii) product technology: materials science, design methodology, and processing, and iii) basic aspects of chemistry: inorganic, organic, analytical, physical, and polymer chemistry and biochemistry.
C2	. skilled in the use of standard laboratory procedures and in the use of equipment for synthetic and analytical work, necessary background knowledge of Mathematics and Physics
C3	. understanding of the position and role of the discipline within science and society, and also in the international character of the discipline. The Bachelor's graduate has become familiar with the following key elements of Chemical Engineering:
C4.	Important aspects of chemical terminology, nomenclature and conventions

9. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

10. Evaluation methods

Implemented at all stages of the program in general.

11-Faculty member

No.	Name	FT or PT	Specialization	Scientific Rank	Years of Experience
1	Dr. Tahseen Ali Al-Hattab	FT	Mass transfer	Prof.	31
2	Dr. Kadhim Finteel Al-Sultani	FT	Corrosion Engineering	Prof.	22
3	Dr Ali Safa Nouri Alsaegh	FT	Mechanical Eng Power	Lecturer	20
4	Dr. Shaker Salih Bahar	FT	Corrosion Engineering	Prof.	17
5	Dr. Nahlla Jabbar	FT	Computers	Lecturer	28
6	Alaa Noor Al-Mousawi	FT	Mass transfer	Assist. Prof	27
7	Satteh Kadhem Ijam	FT	Water treatment	Assist. Prof	35
8	Dr. Hameed Hussain	FT	Mass transfer	Prof	16
9	Dr. Hassanain Ali	FT	Heat transfer	Lecturer	12
10	Dr. Muataz Mohammed	PT	Electrochemical Eng	Assist. Prof	12
11	Zaid Nidhal	FT	Process safety and risk management	Lecturer	10
12	Noora Hamza	FT	Electronics	Assist. Lecturer	12
13	Dr. Ahmad Sayeb	FT	power	Prof	18
14	Dr. Haneen Zuhair	FT	Polymer and composite materials engineering	Assist. Prof	18
15	Dr. Sarmmad AbdAl-Rassoul	FT	Applied Mechanics	Lecturer	14
16	Dr. Hayfaa Adnan AbdAlameer	FT	Chemical science-Organic	Assist. Prof	18
17	Farah Aziz Juber	FT	Petroleum Refinery	Assist. Lecturer	4
18	Roaya Mahmood Jaleel	FT	Mechanical Power	Assist. lecturer	16
19	Marwah Hussein	FT	Catalyst	Assist. Lecturer	7
20	Dr. Ali Obaid Imarah	FT	Biochemical engineering	Lecturer	14
21	Ameer Abed Alrazaak latif	FT	Oil and gas tech.	Assist. Lecturer	2
22	Ameer Abed Alkareem Hadi	FT	Oil and gas Eng.	Assist. Lecturer	2
23	Ali Mohammed Suhail	FT	Oil and gas Eng.	Assist. Lecturer	2
24	shaden Abdullah Hamza	FT	materials engineering _ polymer and composite materials	Assist. Lecturer	3
25	Dhay Saadi Naji	FT	Renewable Energy	Assist. Lecturer	11

Professional Development**Mentoring new faculty members**

Briefly describes the process used to mentor new, visiting, full-time, and part-time faculty at the institution and department level.

Professional development of faculty members

Briefly describe the academic and professional development plan and arrangements for faculty such as teaching and learning strategies, assessment of learning outcomes, professional development, etc.

12. Acceptance Criterion

(Setting regulations related to enrollment in the college or institute, whether central admission or others)

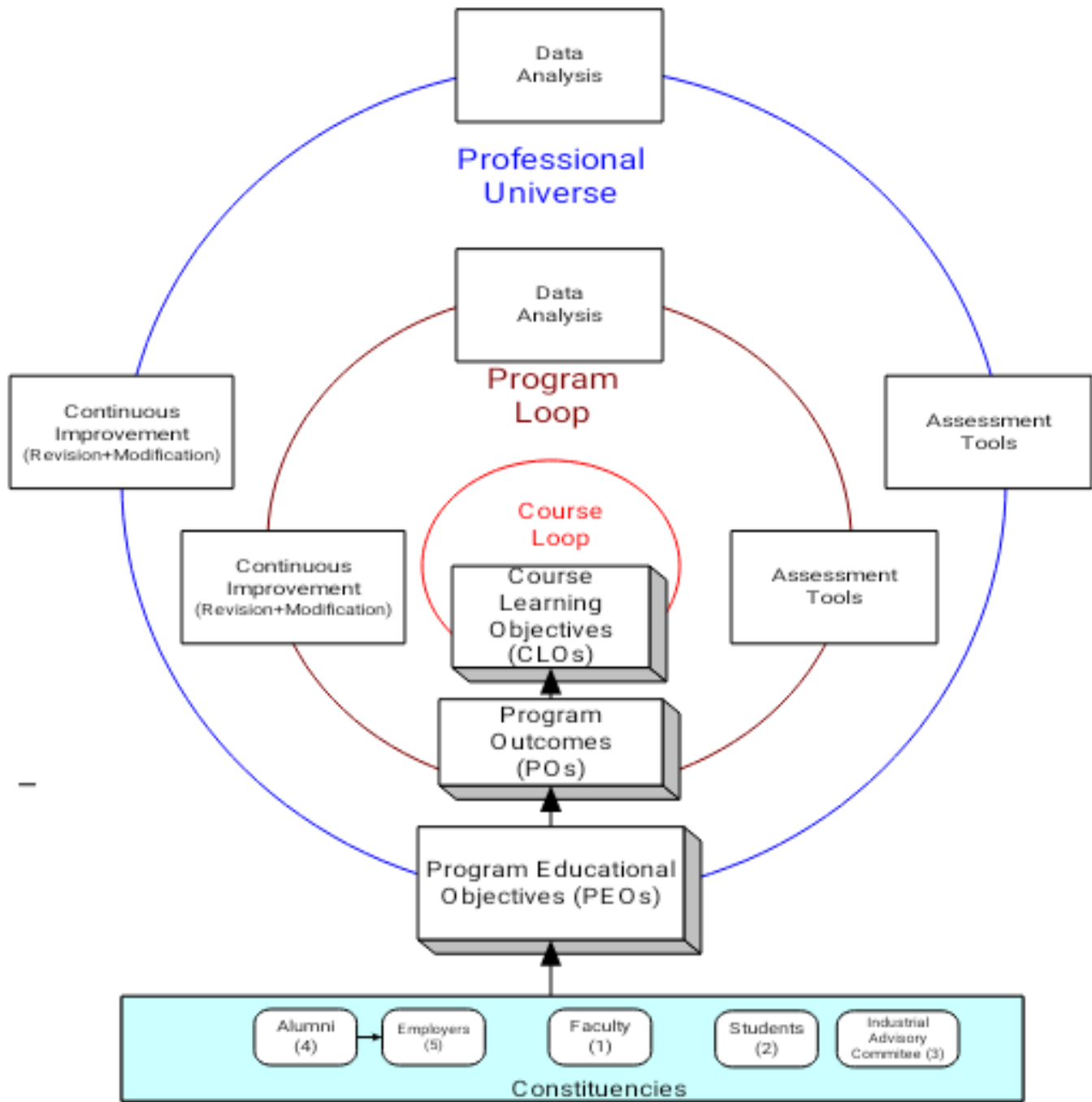
13. The most important sources of information about the program

State briefly the sources of information about the program.

14. Program Development Plan

The Chemical Engineering Technology program of the CE Department has an ongoing assessment and continuous improvement plan. The plan has gone through an evolutionary path and was refined during this time frame. The department has embraced the general philosophy of Outcome Based Education. In its current form it is designed to encompass all aspects of Outcome Based Assessment conforming to TAC/ABET's model as shown in

Figure .1.



Program Skills Outline

				Required program Learning outcomes												
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics				
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	
1	UOBAB0104011	Computer Science	Basic			√				√			√			
	UOBAB0104012	Mathematics I	Basic				√				√			√		
	UOBAB0104013	Chemical Engineering Principles I	Basic				√				√				√	
	UOBAB0104014	Analytical Chemistry	Basic			√				√				√		
	UOBAB0104015	Engineering Drawing and AUTO CAD	Basic			√				√			√			
	UOBAB0104016	Arabic language	Basic		√				√						√	
	UOBAB0104021	Mathematics II	Basic													
	UOBAB0104022	Chemical Engineering Principles II	Basic				√				√					√
	UOBAB0104023	Engineering Statistics	Basic			√				√			√			
	UOBAB0104024	Organic Chemistry	Basic				√					√			√	
	UOBAB0104025	Engineering Mechanics and strength of Materials	Basic				√					√				√
UOBAB0104026	Human rights , freedom and democracy	Basic			√				√					√		

			Basic			√			√			√			
2	UoB12345	Programing Engineering language1	Basic		√				√					√	
	CHE220	Engineering Statistics	Basic												
	CHE210	Engineering Materials	Basic				√				√				√
	UOBAB0104044	Industrial Safety	Basic			√				√			√		
	ENCHMaIV2 13 01	Mathematics III	Basic				√				√			√	
	ENCHMaIV2 13 07	Mathematics IV	Basic				√				√				√
		Fluid Flow I	Basic			√				√				√	
		Fluid Flow II	Basic			√				√			√		
		Properties of petroleum and natural gas	Basic		√				√					√	
			Basic												
3		Electrochemical Engineering	Basic				√				√				√
	CHE-00	Thermodynamics 1	Basic			√				√			√		
		Thermodynamics 2	Basic				√				√			√	
		Engineering analysis	Basic				√				√				√

		Heat transfer I	Basic			√			√			√	
		Corrosion engineering	Basic			√			√			√	
		Mass Transfer-I	Basic		√				√			√	
		Mass Transfer-II	Basic										
	chE3211	Reactor design	Basic				√			√			√
		petroleum refinery engineering	Basic										
		Renewable Energy Resources	Basic			√			√			√	
4		Unit Operation	Basic				√			√			√
	CHE424	Nanotechnology	Basic				√			√			√
		Process Control I	Basic			√			√				√
		Process Control II	Basic			√			√			√	
		Chemical Industries	Basic		√				√				√
		petrochemical Industries	Basic										
		Pollution	Basic				√			√			√
		Gas processing	Basic			√			√			√	

	chE4141	equipment design1	Basic				√				√		√	
		equipment design11	Basic				√				√			√
		Catalyst	Basic			√				√			√	

Course Description Form

First stage:

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Drawing and AUTO CAD	Module Delivery	
Module Type	Support or related learning activity	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0104015		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGI	Semester of Delivery	1
Administering Department	CH	College	EN
Module Leader	Shaden Abdullah Hamza	e-mail	eng.shadan.hamzaa@uobabylon.edu.iq
Module Leader's Acad. Title	Assist. lecturer	Module Leader's Qualification	Msc
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	07/06/2023	Version Number	1.0

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

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

<p>Module Aims أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. To develop an understanding of engineering drawing standards, conventions, and symbols. 2. To acquire skills in manual technical drawing techniques, including geometric construction and orthographic projections. 3. To apply dimensioning and tolerancing principles accurately and effectively. 4. To use AutoCAD software proficiently for creating, editing, and annotating 2D technical drawings. 5. To develop critical thinking and problem-solving skills through practical drawing exercises and projects.
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>Students should be able to demonstrate the following learning outcomes:</p> <ol style="list-style-type: none"> 1. Understand and apply engineering drawing standards and conventions. 2. Interpret and use various technical drawing symbols, notations, and standards. 3. Comply with industry-specific drawing practices and conventions. 4. Perform manual technical drawing techniques. 5. Create accurate and precise geometric constructions. 6. Generate orthographic projections and drawing views using appropriate projection methods. 7. Apply dimensioning and tolerancing principles effectively. 8. Create assembly drawings and related documentation. 9. Generate detailed and accurate assembly documentation. 10. Utilize AutoCAD software proficiently: 11. Navigate and utilize the AutoCAD user interface, tools, and commands effectively. 12. Create, modify, and annotate 2D technical drawings using AutoCAD. 13. Manage drawing files, layers, and plot settings.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A - [60 hrs]</u></p> <ul style="list-style-type: none"> • Engineering Drawing: <p><u>Part B – [60 hrs]</u></p> <ul style="list-style-type: none"> • Engineering Drawing (AutoCAD software) <p>Revision problem classes [5 hrs]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	
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	<ol style="list-style-type: none"> 1. Practical drawing exercises and assignments. 2. AutoCAD-based projects and assignments. 3. Written examinations to assess theoretical knowledge 4. Presentation of drawings and design documentation. 5. Class participation and engagement..
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Material Covered	
Week 1	Introduction to Engineering Drawing: <ul style="list-style-type: none"> • Importance of engineering drawing in design and manufacturing processes. • Drawing standards and conventions. • Drawing instruments and materials.

Week 2	Geometric Construction: <ul style="list-style-type: none"> Principles of geometric construction (e.g., lines, circles, angles, polygons). Drawing views: plan, elevation, section, auxiliary views.
Week 3	<ul style="list-style-type: none"> Line styles and types engineering Geometric constructions exercises
Week 4	Orthographic projections
Week 5	Exercise on projections.
Week 6	Dimensioning and Tolerancing: <ul style="list-style-type: none"> Dimensioning techniques: size, location, and geometric tolerancing
Week 7	Mid-term Exam
Week 8	Introduction to AutoCAD: <ul style="list-style-type: none"> Overview of AutoCAD software and its applications in engineering drawing. User interface, commands, and settings. Creating and managing drawing files
Week 9	Basic exercises
Week 10	Creating 2D Drawings with AutoCAD: <ul style="list-style-type: none"> Drawing basic shapes, lines, and curves. Modifying and editing drawings. Applying dimensioning and annotation
Week 11	Geometric constructions exercises
Week 12	Advanced AutoCAD Techniques: <ul style="list-style-type: none"> Blocks and attributes for efficient drawing creation. Layers and line types for organizing and managing drawings. Plotting and printing techniques
Week 13	Practical Drawing Exercises and Projects: <ul style="list-style-type: none"> Applying learned concepts and techniques through hands-on drawing exercises.
Week 14	Undertaking projects that require creating and documenting engineering designs using AutoCAD.
Week 15	Mid exam 2
Week 16	The preparatory week before the Final Exam

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<ul style="list-style-type: none"> ▪ الرسم الهندسي ، عبد الرسول الخفاف 	نعم
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

Module Information

معلومات المادة الدراسية

Module Title	Physics		Module Delivery	
Module Type	Support		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code				
ECTS Credits	2			
SWL (hr/sem)	30			
Module Level	UGII	Semester of Delivery		

Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Ali Mohammed Suhail	e-mail	eng618.ali.mohammed@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	07/06/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. To learn the physical properties of the items. 2. To know the types of units and the units conversion. 3. To learn the vectors and the relationships between two or more vectors. 4. To learn the principles of the motion in one dimension. 5. To study the Newton's laws. 6. To study the motion in two or three dimension. 7. To study principles of fluids. 8. To study the work, energy and the relationship between them.
Module Learning Outcomes	<ol style="list-style-type: none"> 1. Identify the methods of how to calculate the properties of the items.

<p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 2. List the types of engineering units and their conversion 3. The student will be familiar with the vectors and how to apply them in the geometries problems. 4. The student understands the average and the instantaneous velocity and acceleration and the suitable ways of drawing them accurately. 5. The student will be able to know applications of Newton's laws 6. Identify understands the average and the instantaneous velocity and acceleration in two or three dimensions. 7. Students will be able to know the fluids and their influences. 8. The students will identify the types of energies and correlate with work.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Principles of the materials properties</u> Calculate the properties of the materials such as mass, volume and density for the materials, the properties of the fluids such as viscosity and velocity. Finally, the properties of the air/fluid such as the surface tension. [4 hrs]</p> <p><u>Units and their conversions.</u> The unit's types: standard international units, British and English Units. Conversion table between these units and the suitable way to covert from each one to other mathematically. [4 hrs]</p> <p><u>The vectors</u> Types of vectors systems. Study the relationship between them. Applications of Dot and cross products. [4 hrs]</p> <p><u>Motion in one dimension.</u> The average and instantaneous velocity and acceleration of the particle moves in one dimensional direction. Look at the way to represent them mathematically and graphically. [4 hrs]</p> <p><u>Newton's Laws</u> The laws of Newton and their applications. Effect of the gravity on bodies and [2 hrs]</p>

	<p><u>Motion in two or three dimensions</u></p> <p>Motion of the particles in two or three dimensions. Free fall bodies and the motion of the projectiles [4 hrs]</p> <p><u>Fluids</u></p> <p>Types of fluids and their classifications. Properties of fluids. [2 hrs]</p> <p><u>Energies and work</u></p> <p>Potential, kinetic and pressure energies. Types of works. The relationship between the energy and work. [4 hrs]</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. In addition to encouraging the students to involve in teamwork in order to achieve the experience and share their knowledge with classmates.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	30		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	4,6,8,9,12	
	Assignments	5	10% (10)	4,6,8,9,12	
	Report	1	10% (10)	13	
Summative assessment	Midterm Exam	2 hr	10% (10)	10	
	Final Exam	2hr	50% (50)	-	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Principles of the materials Properties
Week 2	Principles of the materials Properties
Week 3	Units and their conversions.
Week 4	Units and their conversions.
Week 5	The vectors
Week 6	The vectors
Week 7	Motion in one dimension.
Week 8	Motion in one dimension.
Week 9	Newton's Laws
Week 10	Mid term Exam
Week 11	Motion in two or three dimensions
Week 12	Motion in two or three dimensions
Week 13	Fluids
Week 14	Energies and work
Week 15	Energies and work
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	N/A
Week 2	N/A
Week 3	N/A
Week 4	N/A
Week 5	N/A
Week 6	N/A
Week 7	N/A

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Physics by Jearl Walker, 10 ed, 2014	No
Recommended Texts	-	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Computer science		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory	
Module Code	UoB12345		<input type="checkbox"/> Lecture	
ECTS Credits	3		<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	150		<input type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGI	Semester of Delivery	2	
Administering Department	CH	College	EN	
Module Leader	Ameer Abdulrazzaq Abdul-lateef	e-mail	eng392.ameer.abdulrazzaq@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	3/03/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Leaving Certificate Computer Science aims to develop and foster the learner's creativity and problem solving, along with their ability to work both independently and collaboratively..
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1. Learn about computer organization and how to connect to computer system2. This course deals with the basic concept of the software system3. This is the basic programming language.4. To understand the operating system.5. Problem solving and problem solving method <p>1. 6. studying computer network and GUI</p>
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none">1. The student is prepared to receive a solid scientific subject2. The student learns about the computer and the computer hardware and software parts3. - The student learns how to identify applied programs4. Learn how different computer applications work, such as Excel and Word5- Consolidating the scientific material correctly
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	conducting daily exams
6- Activating the student's role in understanding and benefiting.	

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.72
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.28
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction computer science
Week 2	Computer science fundamental
Week 3	Memory and types of memory
Week 4	software Types of software, Application programs, Computer languages
Week 5	Operating system
Week 6	GUI
Week 7	COMPUTER NETWORK
Week 8	: Ms-office
Week 9	Word processing

Module Information

معلومات المادة الدراسية

Module Title	statistics engineering		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory	
Module Code	CHME1202		<input type="checkbox"/> Lecture	
ECTS Credits	6		<input type="checkbox"/> Lab	
SWL (hr/sem)	150		<input checked="" type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGI	Semester of Delivery	2	
Administering Department	CH	College	EN	
Module Leader	Haneen Zuhair Naji		e-mail	Eng.haneen.zuhair@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	3/03/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<p>1. The primary aim of the course is to help students develop a basic understanding and use of statistical concepts and methods to facilitate study and research in other disciplines. Major topics that we will cover include: 1. Producing (collecting) data 2. Exploring data analysis (EDA) which includes organizing, summarizing, and visualizing data and studying relationships among variables. 3. Studying various probability models 4. Understanding sampling distributions and 5. Making statistically correct interpretations using estimation and inferences Specific topics we will cover include data collection, descriptive statistics, both graphical and numerical; measures of central tendency; measures of variability; grouped data; discrete and continuous distributions such as binomial distribution, the normal distribution; sampling distributions and central limit theorem; the t-distribution; the fundamentals of statistical interference ----confidence intervals and hypothesis testing; the chi-square tests and simple regression and correlation. Students who have successfully learned these materials will be prepared to interpret data from their field of study. Distinguish among potential, kinetic, and internal energy.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>Only through practice and repetition is one able to develop an understanding of the different techniques and approaches used in statistical analysis. Therefore, it is important to use learning strategies such as practice questions and problem-solving exercises to improve one's critical thinking skills in statistics.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>The student can use the charts, tables, formulas, and computer computing for getting A Learning Strategy is a person's approach to learning and using information. Students use Learning Strategies to help them understand information and solve problems. Students who do not know or use good learning strategies often learn passively and ultimately fail in school. Learning Strategy instruction focuses on making students more active learners by teaching them how to learn and how to use what they have learned to be successful..</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.72
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.28
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	introduction of statistics
Week 2	Types of variables ,Application of statistics
Week 3	scales types Scales of measurement
Week 4	Methods of data collection ,categorical frequency distribution
Week 5	Diagrammatic and graphic presentation of data
Week 6	Measures of central tendency
Week 7	mean,geometric mean,harmonic mean
Week 8	mode,median
Week 9	measures of Dispersion (variation)

Week 10	Quartile Deviation, moment, skewness, kurtosis
Week 11	11midterm exam
Week 12	Elementary Probability
Week 13	Permutation
Week 14	Random variables and probability
Week 15	Simple linear regression and correlation
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Basic principles and calculations in chemical engineering David M. Himmelblau, PTR Prentice Hall.	Yes
Recommended Texts	Handbook of chemical engineering calculations, N. P. Chohey, Tyler Hicks.	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information				
معلومات المادة الدراسية				
Module Title	Chemical Engineering Principles I		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	CHME1103			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGI	Semester of Delivery		1
Administering Department	CH	College	EN	
Module Leader	Dr. Hassanin Mehsin Ali		e-mail	Eng.hassanin.mehsin@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	3/05/2025	Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none">1. To give the students the skills of treating all types of units and its conversions.2. To understand the relations between mole, mass and force.3. To know the basics of temperature, pressure, density and concentration.4. To provide the student the principles of stoichiometry and the chemical reactions.5. To deal with excess and limiting reactant and conversion of the reactants.6. To understand the application of gas law for ideal and real gases.7. Be able to make material balances for equipment with and without chemical reaction.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1. Use the units to solve problems.2. Deal with mass, mole and force and other derived dimensions.3. Use the relations of pressure and temperature.4. Study the stoichiometry.5. Using the real and ideal gas law and its relations.6. The concepts of material balances for chemical equipment and processes with and without chemical reactions.7. The relations of recycle, bypass and purge.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Units and dimensions. Part B – Moles, Temperature, pressure and concentration. Part C – stoichiometry. Part D – gas law. Part E – material balances.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	It provides the student the ability of using units for easy solving problems, conversion of units and relations between main and derived units. The student will be familiar with complex equations. The student can perform the material balance for equipment. Also he can treat all types of reactions with complete or incomplete
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reactions.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2.6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Units and dimensions
Week 2	The Mole Unit
Week 3	Mass, force and their conversion, density, concentration and API
Week 4	Basis, temperature and pressure
Week 5	The Chemical Equation and Stoichiometry
Week 6	Stoichiometry
Week 7	The material balance
Week 8	Program of analysis of material balance problems
Week 9	Material balance problems that do not entail solving simultaneous equations
Week 10	Material balance problems involving simultaneous equations
Week 11	Recycle, bypass and purge

Week 12	Ideal gas law
Week 13	Real gas relationships
Week 14	Vapor pressure and liquids
Week 15	Partial saturation and humidity
Week 16	FINAL EXAM

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Basic principles and calculations in chemical engineering David M. Himmelblau, PTR Prentice Hall.	Yes
Recommended Texts	Handbook of chemical engineering calculations, N. P. Chopey, Tyler Hicks.	No
Websites		

Grading Scheme

مخطط الدرجات

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

Module Information

معلومات المادة الدراسية

Module Title	Analytical Chemistry		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory	
Module Code	ENCHAc1 04 04		<input type="checkbox"/> Lecture	
ECTS Credits	6		<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	125		<input checked="" type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGIII	Semester of Delivery	5	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Hayfaa adnan	e-mail	Haifaadnan_81@uobabylon.edu.iq	
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D.	
Module Tutor	Hayfaa adnan	e-mail	Haifaadnan_81@uobabylon.edu.iq	
Peer Reviewer Name	n.a.	e-mail	n.a.	
Scientific Committee Approval Date	/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims	
أهداف المادة الدراسية	9. To introduce the fundamental principles and theories of Analytical Chemistry 2.

	<p>To provide students with Expression of concentration .</p> <p>10. To enhance problem-solving and analytical skills related to Analytical Chemistry</p> <p>11. To encourage critical thinking and the ability to apply Analytical Chemistry concepts to real-world engineering problems.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>9. Demonstrate a solid understanding of the fundamental principles and theories of Analytical Chemistry</p> <p>10. Communicate effectively, both orally and in writing, about Analytical Chemistry concepts and solutions</p> <p>11. involves separating, identifying and determining</p> <p>12. the relative amounts of components of a sample of matter.</p> <p>13. identification of elements, ions, or compounds present in a sample analyst</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Introduction to analytical chemistry and their uses,</p> <ul style="list-style-type: none"> • Definition and importance of Types of analysis in analytical chemistry and their uses [3hrs] • - Expression of concentration [3hrs] • Basic concepts and terminology [3hrs] • Standard solutions [4hrs] • Amounts of reactants and products [4hrs] • Chemical equilibrium [5hrs] • The relationship between chemical kinetics and chemical equilibrium, [5hrs] • Gravimetric analysis [5hrs] <p>Volumetric analysis their uses and classification [12 hrs]</p> <p>Titer metric analysis calculations, Acid-base titrations, Precipitation Titrations, Complex metric titrations, Reduction-oxidation titrations [12 hrs]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of Analytical Chemistry</p>
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	<p>. The lectures will provide a theoretical foundation and present key concepts and equations.</p> <p>Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve Analytical Chemistry problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of heat transfer concepts.</p> <p>Laboratory Sessions: Practical laboratory sessions will be conducted to allow students to Titer metric analysis calculations, Acid-base titrations, Precipitation Titrations, Complex metric titrations, Reduction-oxidation titrations. These sessions will help students develop practical skills and relate theory to real-world applications.</p> <p>Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل لدراسي المنتظم للطلاب لفصل	78	Structured SWL (h/w) الحمل لدراسي المنتظم للطلاب اسبوعيا	6.2
Unstructured SWL (h/sem) الحمل لدراسي غير المنتظم للطلاب لفصل	47	Unstructured SWL (h/w) الحمل لدراسي غير المنتظم للطلاب اسبوعيا	3.8
Total SWL (h/sem) الحمل لدراسي الكلي للطلاب لفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	

	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Types of analysis in analytical chemistry and their uses
Week 2	Expression of concentration
Week 3	Standard solutions
Week 4	Amounts of reactants and products
Week 5	Chemical equilibrium
Week 6	The relationship between chemical kinetics and chemical equilibrium
Week 7	Exam 1
Week 8	Gravimetric analysis
Week 9	Application of Gravimetric analysis
Week 10	Volumetric analysis their uses and classification
Week 11	Titer metric analysis calculations, Acid-base titrations
Week 12	Titer metric analysis calculations Precipitation Titrations.
Week 13	Titer metric analysis calculations. Complex metric titrations,
Week 14	Titer metric analysis calculations Reduction-oxidation titrations
Week 15	Exam 2

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Acid-base titrations

Week 4	Lab 2: Precipitation Titrations.
Week 7	Lab 3: Complex metric titrations
Week 10	Lab 4: Reduction-oxidation titrations

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	https://chemistry.com.pk/books/skoog-fundamentals-of-analytical-chemistry1/	Yes
Recommended Texts	https://chemistry.com.pk/books/skoog-fundamentals-of-analytical-chemistry1/	No
Websites	https://chemistry.com.pk/books/skoog-fundamentals-of-analytical-chemistry1/	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Organic Chemistry		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory	
Module Code	ENCHOc1 10 10		<input type="checkbox"/> Lecture	
ECTS Credits	6		<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	125		<input checked="" type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGIII	Semester of Delivery	5	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Hayfaa adnan	e-mail	Haifaadnan_81@uobabylon.edu.iq	
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D.	
Module Tutor	Hayfaa adnan	e-mail	Haifaadnan_81@uobabylon.edu.iq	
Peer Reviewer Name	n.a.	e-mail	n.a.	
Scientific Committee Approval Date	/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none">1. To introduce the fundamental principles and theories of Organic Chemistry2. To provide students with Expression of concentration .3. To enhance problem-solving and analytical skills related to Organic Chemistry4. To encourage critical thinking and the ability to apply Organic Chemistry concepts to real-world engineering problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1. Demonstrate a solid understanding of the fundamental principles and theories of Organic Chemistry2. Communicate effectively, both orally and in writing, about Organic Chemistry concepts and solutions3. involves study of the structure and properties of compounds containing carbon.
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following.</p> <p>Introduction to organic chemistry and their uses,</p> <ul style="list-style-type: none">• Definition and Chemical Bonding in organic compounds [3hrs]• Functional groups and classification of organic compounds[3hrs]• Alkanes and Cycloalkanes [3hrs]• Alkenes and Cycloalkenes[4hrs]• Alkynes and Cycloalkynes [4hrs]• Aromatic compounds [5hrs]• Alkyl halides[5hrs]•Alcohols, Ethers [5hrs] <p>Ethers ,Aldehydes and Ketones, Carboxylic Acids. [12 hrs]</p> <p>Salts and Esters of carboxylic acids, Amine .[12 hrs]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of organic Chemistry . The lectures will provide a theoretical foundation and present key concepts and equations.</p> <p>Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve organic Chemistry problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of heat transfer concepts.</p> <p>Laboratory Sessions: Practical laboratory sessions will be conducted to allow students to determination boiling point and melting point and purification . These sessions will help students develop practical skills and relate theory to real-world applications.</p> <p>Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	33	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11

assessment	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Chemical Bonding in organic compounds
Week 2	Functional groups and classification of organic compounds
Week 3	Alkenes and Cycloalkanes
Week 4	Alkenes and Cycloalkenes
Week 5	Alkynes and Cycloalkanes
Week 6	Aromatic compounds
Week 7	Exam 1
Week 8	Alkyl halide
Week 9	Alcohols.
Week 10	Ethers,
Week 11	Aldehydes and Ketones
Week 12	Salts and Esters of carboxylic acids.
Week 13	Carboxylic Acids
Week 14	Amine

Week 15	Exam 2
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: determination of boiling point
Week 4	Lab 2: determination of melting point
Week 7	Lab 3: determination of purification
Week 10	Lab 4: Fractional distillation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	https://www.google.iq/search?sa=X&hl=en&tbm=bks&tbm=bks&q=inauthor:%22Robert+T.+Morrison%22&ved=2ahUKewjHsc3XycP_AhVgR_EDHSM3BKgQ9Ah6BAgPEAQ	Yes
Recommended Texts	https://www.google.iq/search?sa=X&hl=en&tbm=bks&tbm=bks&q=inauthor:%22Robert+T.+Morrison%22&ved=2ahUKewjHsc3XycP_AhVgR_EDHSM3BKgQ9Ah6BAgPEAQ	No
Websites	https://www.google.iq/search?sa=X&hl=en&tbm=bks&tbm=bks&q=inauthor:%22Robert+T.+Morrison%22&ved=2ahUKewjHsc3XycP_AhVgR_EDHSM3BKgQ9Ah6BAgPEAQ	

Grading Scheme

مخطط الدرجات

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

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

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

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Mechanics and strength of Materials		Module Delivery
Module Type	Supplementary		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ENCHEm1 11 11		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGI	Semester of Delivery	
Administering Department	Chemical Eng.	College	College of Engineering
Module Leader	Mohanad Jebar Nehab	e-mail	mohanadjebar@gmail.com
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	02/03/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none">5. To introduce students to the fundamental concepts and principles of statics, including equilibrium, force systems, and analysis of structures.6. To develop students' understanding of the mechanical behavior of materials under various loading conditions.7. To enable students to apply static equilibrium principles to solve engineering problems involving particles, rigid bodies, and structural components.8. To provide students with knowledge of stress, strain, and deformation of materials, including axial loading, torsion, bending, and combined loading.9. To equip students with the ability to analyze and design simple structural members subjected to various loading conditions.10. To enhance students' problem-solving skills through practical applications and case studies related to statics and strength of materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>Upon successful completion of the Engineering Mechanics and Strength of Materials module, students will be able to:</p> <ol style="list-style-type: none">4. Demonstrate a comprehensive understanding of the fundamental concepts and principles of statics and strength of materials.5. Apply the laws of static equilibrium to solve engineering problems involving particles, rigid bodies, and structural components.6. Analyze and design simple structural members subjected to various loading conditions, including axial loading, torsion, bending, and combined loading.

	<ol style="list-style-type: none"> 7. Apply the laws of friction to solve engineering problems and understand their practical applications. 8. Evaluate the mechanical behavior of materials under different loading conditions, including stress, strain, and deformation. 9. Construct and interpret shear force and bending moment diagrams for beams. 10. Demonstrate the ability to work effectively in groups, collaborate, and engage in constructive discussions related to statics and strength of materials. 11. Employ critical thinking and problem-solving skills to identify, formulate, and solve engineering problems related to the module topics. 12. Utilize laboratory experiments, case studies, and real-world applications to enhance understanding and application of statics and strength of materials concepts.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Statics:</p> <ol style="list-style-type: none"> 1. Introduction to Engineering Mechanics: <ul style="list-style-type: none"> • Basic concepts and principles of engineering mechanics • Fundamental laws and equations of statics • Free body diagrams and equilibrium of particles • Moments and couples 2. Forces and Force Systems: <ul style="list-style-type: none"> • Resultant and equilibrium of force systems • Moments and couples in 2D and 3D 3. Analysis of Structures: <ul style="list-style-type: none"> • Trusses and frames • Method of joints and method of sections 4. Friction and Applications: <ul style="list-style-type: none"> • Laws of friction • Applications of friction in engineering systems <p>Strength of material</p> <ol style="list-style-type: none"> 5. Properties of Materials: <ul style="list-style-type: none"> • Mechanical properties of materials

	<ul style="list-style-type: none"> • Stress, strain, and deformation • Axial loading and deformation of bars <p>6. Thermal deformations and stresses</p> <ul style="list-style-type: none"> • Thermal Stresses. • Thermal Expansion, • Members compose of Two Materials in Parallel. • Members compose of Two Materials in Series. <p>7. Flexural stress and strain</p> <ul style="list-style-type: none"> • Pure bending and bending of beams • Shear force and bending moment diagrams
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ul style="list-style-type: none"> • Lectures by experienced faculty members • Tutorials and problem-solving sessions • Laboratory experiments and demonstrations • Case studies and real-world applications • Group discussions and collaborative learning • Independent study and self-assessment
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.32
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1.68
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	3,6,9,12,15	
	Assignments CW	5	10% (10)	3,6,9,12,15	
	Assignments HW	5	10% (10)	3,6,9,12,15	
	Projects / Lab.	1	10% (10)	13	
Summative assessment	Midterm Exam	2 hr	10% (10)	12	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fundamental Terms: Introduction to mechanics, basic Terms, Introduction to metrics, -scalars and vectors, General principles and concepts.
Week 2	Force systems: Types of Forces Systems, Resultant of concurrent Forces Systems, Resultant of collinear Forces.
Week 3	Moments and Couples: Moments, Sign of Moments, Equilibrium of Parallel Forces, Uniformly Distributed Loads, Couples.
Week 4	Tutorial
Week 5	Equilibrium: Equilibrium of concurrent Forces Systems, Equilibrium of collinear Forces, Resultant of non-concurrent coplanar forces.
Week 6	Equilibrium: Methods of Solution, Free Body, Analysis of a Simple Structure, Components of a Force, Rectangular Components of a Force, Equilibrium of general system.
Week 7	Analysis of Structures: Trusses, Methods of Joints.
Week 8	Analysis of Structures: Method of Sections, Frame
Week 9	Tutorial
Week 10	Friction, Friction applications
Week 11	Properties of Materials: Stresses, Simple Stresses, Tension Test, Stress and Strain, Modulus of

	Elasticity.
Week 12	Properties of Materials: Ductility, Brittle Materials, Allowable Stresses, Factor of Safety, Poisson's Ratio
Week 13	Thermal deformations and stresses: Thermal Stresses, Thermal Expansion, Members compose of Two Materials in Parallel, Members compose of Two Materials in Series.
Week 14	Flexural stress and strain: Types of Beams, Shear Force and Bending Moment Diagrams, Location of Bending Moment From Shear Diagram Area, Beams Deflection
Week 15	Tutorial
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	mechanical workshop and measuring instruments laboratory 1: turning
Week 2	mechanical workshop and measuring instruments laboratory 2: forging
Week 3	mechanical workshop and measuring instruments laboratory 3: Plumbing
Week 4	mechanical workshop and measuring instruments laboratory 4: carpentry
Week 6	mechanical workshop and measuring instruments laboratory 6: measuring instruments

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Meriam, J. L., Kraige, L. G. " Engineering Mechanics-Static", 5th edition	Yes
Recommended Texts	Hibbeler, " Engineering Mechanics-Static", 13rd edition.	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Production		Module Delivery	
Module Type	Support		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0104027			
ECTS Credits	3			
SWL (hr/sem)	70			
Module Level	UGI	Semester of Delivery		3
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Shaden Abdullah Hamza		e-mail	eng.shadan.hamzaa@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification		Ph.D.

Module Tutor	None	e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	13/11/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. To provide students with an understanding of the main metal manufacturing processes. 2. To know the process parameters and capabilities, as well as the relationship between material properties and the manufacturing process. 3. To know the casting processes and their types' advantages and dis advantages 4. To understand the fusion welding processes and its types. 5. To learn the metal forming process.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> 13. demonstrate a holistic understanding on the working principle, capability and operation of common manufacturing processes. 14. Select the suitable process for forming or manufacturing metals. 15. Justify appropriate manufacturing processes for specific product requirements List the types of engineering materials and its branches relating to advance materials 16. The student will be familiar with the simple casting process. 17. The student will be able to know the types of forming processes and their

	<p>advantages and dis advantages.</p> <p>18. Identify the welding process and its type.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Manufacturing Processes:</u> Manufacturing process: introduction to manufacturing processes Definition, Classification of manufacturing process, Sand Casting: Pattern – materials, allowances, types, molding types, molding procedure, molding and properties. [3 hrs]</p> <p><u>Special Casting:</u> Shell mould casting, investment casting, permanent mould casting, Die casting, and centrifugal casting. [7 hrs]</p> <p><u>Metal Forming Process.</u> Extrusion: Classification, Advantages, Limitations and applications Wire Drawing: Classification, Advantages, Limitations and applications Rolling: Cold and Hot Rolling processes, Classification, Advantages, Limitations and applications Sheet Metal Working: Deep drawing process. (5 hrs)</p> <p><u>welding processes</u> fundamental of Welding Arc Welding Resistance welding, gas welding Soldering . [7 hrs]</p>

<p>Learning and Teaching Strategies استراتيجيات التعلم والتعليم</p>	
<p>Strategies</p>	<p>The main strategy that will be adopted in delivering this module is to encourage students’ participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. In addition to encouraging the students to involve in teamwork in order to achieve the experience and share their</p>

knowledge with classmates.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	70		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Definition of manufacturing, manufacturing industries and products, Materials in Manufacturing,

	Manufacturing Processes and Production systems
Week 2	Manufacturing Processes and Production systems.
Week 3	Fundamental of metal casting, Types of metal casting processes
Week 4	Fundamental of metal casting, Types of metal casting processes
Week 5	Fundamentals of Metal Forming, Overview of Metal Forming, Temperature in Metal Forming, Friction and Lubrication in Metal Forming
Week 6	Fundamentals of Metal Forming, Overview of Metal Forming, Temperature in Metal Forming, Friction and Lubrication in Metal Forming
Week 7	Rolling, forging, extrusion
Week 8	Cutting operation, bending operation, drawing
Week 9	Overview of machining technology, Machine operation and machine tools
Week 10	Mid term Exam
Week 11	Grinding
Week 12	fundamental of Welding
Week 13	Arc Welding
Week 14	Resistance welding, gas welding
Week 15	Soldering
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: sand casting
Week 2	Lab 2: grinding
Week 3	Lab 3: turning
Week 4	Lab 4: welding
Week 5	Lab 5: Carpentry workshop
Week 6	Lab 6: milling workshop

Week 7

Lab 7: drilling workshop

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Modern Manufacturing Materials, Processes, and Systems, Seventh Edition, Mikell P. Groover	Yes
Recommended Texts	<ol style="list-style-type: none"> Principles of manufacturing materials and processes- J.S.Campbell, Tata McGraw Hill. Manufacturing Engineering and Technology, 4th Edition- S.Kalpakjian and S.R. Scsimid, Pearson Education. Materials and processes in manufacturing- DeGarmo, Black and Kohser, Prentice Hall of India. Principle of Metal Casting- Heine, Loper and Rosenthal, Tata McGraw Hill. 	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Arabic language اللغة العربية		Module Delivery	
Module Type	Supported learning activity		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0104016			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	UG	UGI	Semester of Delivery	1
Administering Department	CH		College	EN
Module Leader	METHAQ KADHIM ABDULABBAS		e-mail	meethaq1976@gmail.com
Module Leader's Acad. Title			Module Leader's Qualification	
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	07/06/2023		Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. تقوية القدرة اللغوية لدى الطلاب 2. اكتسابهم مهارة التعبير الصحيح 3. تعويد الطلاب على فهم المادة المقروءة ؛ والتعبير الصحيح . 4. تنمية قدرات الطلاب ومهاراتهم الخطبية والاملائية فضلا عن اطلاعه على الارث الادبي
Module Learning	1. فهم لغة القرآن الكريم

<p>Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>2. القدرة على التعبير الصحيح في لغته الام وهي اللغة العربية 3. زيادة حصيلة الطالب الثقافية عن طريق التعرف على التراث الادبي 4. يجنبه درس اللغة العربية من الوقوع في الاخطاء الاملائية 5. القدرة على فهم علامات تعبيرية اخرى لها دلالات خاصة ك علامات الترقيم</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>1. تمييز الفعل عن الاسم 2. تقسيم المعارف الى انواع متعددة 3. الفرق بين الجملة الاسمية والفعلية 4. معرفة خصوصية الادب الجاهلي عن غيره من الاداب 5. التعرف على ابرز شعراء العصر الجاهلي.</p>

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	اقسام الكلام
Week 2	انواع المعارف الاسم العلم
Week 3	الضمائر
Week 4	اسم الاشارة
Week 5	الاسماء الموصولة
Week 6	المعرف بال
Week 7	المعرف بالاضافة
Week 8	المتنى
Week 9	جمع المذكر السالم
Week 10	جمع المؤنث السالم
Week 11	جمع التكسير
Week 12	الاسماء الخمسة
Week 13	الادب والنصوص؛ ادب ما قبل الاسلام
Week 14	الخصائص المعنوية واللفظية
Week 15	من الشعراء (امرؤ القيس)
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	
Week 2	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Mathematics I		Module Delivery
Module Type	Support learning activity		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	UOBAB0104012		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	U	UGI	
Administering Department	CH		College
			EN
			1

Module Leader	Dhay Saadi Naji	e-mail	eng350.dhy.sadie@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	07/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> The aims of the modules are - To introduce engineering students to the central role that mathematics plays in the development and practice of engineering. To motivate the comprehension and use of important analytical concepts, calculus methods and linear mathematics fundamental to engineering. To help students to begin to develop the skill of analysing problems in a rational (rigorous, logical) and methodical manner. To develop the students' ability to transfer their mathematical understanding (and the associated methods) to diverse engineering application areas. This course is to provide students with a Functions; Domain and range of functions; composite functions; Limits and continuity; Differentiation; Applications of differentiation (curve sketching, maxima and minima and rates of change) .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> Recognize and be able to apply mathematical tools and techniques to solve engineering-based problems. Appropriately apply and manipulate real-valued functions commonly used in engineering applications. Demonstrate a repertoire of problem-solving skills and an ability to generalize and transfer ideas, appropriate to simple engineering applications of mathematical concepts Demonstrate an understanding of mathematics and mathematical processes consistent with the syllabus. Reason logically and recognize incorrect reasoning. Use mathematical terminology and formulae to communicate effectively to other technically literate people
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following.</p> <ol style="list-style-type: none"> Modelling with Functions: How do we use mathematics to describe related quantities? Limits: How do we work with the infinitely small and the infinitely large? The Derivative: In what different ways can rates of change be represented? How are rates of change described and used? Computing Derivatives: How are derivatives efficiently computed?

	5. Using the Derivative: How can we use the derivative to solve complex problems from the sciences? 6. The Area Problem: How is the rate of change problem related to the area problem?
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	<ol style="list-style-type: none"> Solve a set of practical examples by the academic staff Using illustrations such as the PowerPoint to communicate the idea Encouraging students to participate during the lecture Daily exams with practical and scientific questions Putting grades for homework and assigned reports Quarterly exams for the academic curriculum in addition to the mid-year exam and the final exam .

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	6% (6)	3,5, 10	LO #1, 2, 10 and 11
	Assignments	2	4% (4)	Continuous	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
Week	Material Covered

Week 1	Prerequisites for Calculus :Coordinates and Graphs in the Plane; Directions and Quadrants; Distance between Points; Graphs of Equations; Intercepts and More about Graphing; Slope and Equations for Lines; Slope of Non-vertical Lines; Lines That are Paralle
Week 2	Functions and Their Graphs: Domains and Ranges are Often Intervals; Even Functions and Odd Functions; Functions Defined in Pieces; How to Shift a Graph; Equations for Circles in the Plane; Equations for Parabolas.
Week 3	A Review of Trigonometric Functions: Radian Measure; The Six Basic Trigonometric Functions; Calculating Sines and Cosines; Graphs of Trigonometric Functions.
Week 4	Limits and Continuity: The Limit of a Function; The functions that haven't limits; The theories (1, 2, 3 to 6) of limit; Eliminating Common Factors from Zero Denominators
Week 5	Infinite limits , Limits at infinity , Intermediate value theorem
Week 6	Continuous Functions; Continuity at a Point; Continuity Test; Properties of Continuous Functions; Inverse Functions and Continuity; composites of continuous functions; Limits of Continuous Functions.
Week 7	Derivatives: definition and basic rules , Average vs. instantaneous rate of change: Secant lines: Estimating derivatives , Differentiability,Power rule
Week 8	Derivative rules: constant, sum, difference, and constant multiple: Combining the power rule with other derivative rules: Derivatives of $\cos(x)$, $\sin(x)$, e^x , and $\ln(x)$: Product rule, Quotient rule Derivatives of $\tan(x)$, $\cot(x)$, $\sec(x)$, and $\csc(x)$
Week9	Derivatives: mathematical definition of the derivative; Tangents and the Derivative at a Point; ; Defining Slopes and Tangent Lines; The Derivative of a function; The Slope of Lines;
Week 10	Velocity, Speed, and Other Rate of Change such as acceleration and jerk;
Week 11	Derivatives of Trigonometric Functions such as Sine, Cosine and other Basic Functions; Chain rule: chain rule and other advanced topics
Week 12	Implicit Differentiation and Fractional Powers; Lenses, Tangents, and Normal Lines; Using Implicit Differentiation to Find Derivatives of Higher Order; Fractional Powers of Differentiable Functions; Linear Approximations and Differentials.
Week 13	Applications of Derivatives: Related Rates of Change; Maxima, Minima, and the Mean Value Theorem; The First Derivative Theorem; The Mean Value Theorem; Curve Sketching with y' and y'' ; Points of Inflection; Graphing with y' and y'' .
Week 14	Graphing Rational Functions Asymptotes and Dominant Terms: Horizontal and Vertical Asymptotes; Oblique Asymptotes; Optimization; Applied Examples from Mathematics; Applied Examples from Industry.
Week 14	Solving related rates problems: Approximation with local linearity: L'Hôpital's rule: A L'Hôpital's rule: composite exponential functions
Week16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus twelve edition	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

Module Information

معلومات المادة الدراسية

Module Title	Mathematics II		Module Delivery	
Module Type	Supported learning activity		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0104021			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UG	UGII		
Administering Department	CH		College	EN
Module Leader	Dhay Saadi Naji		e-mail	eng350.dhy.sadie@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	PhD
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	07/06/2023		Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. solve complex and novel problems using tools from calculus 2. build a mental framework of calculus that serves as a foundation for future learning 3. see yourself as a confident and capable user and communicator of mathematics 4. possess skills and habits for effectively learning math
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Recognize and be able to apply mathematical tools and techniques to solve engineering based problems. 2. Appropriately apply and manipulate real-valued functions commonly used in engineering applications 3. Demonstrate a repertoire of problem-solving skills and an ability to generalise and transfer ideas, appropriate to simple engineering applications of mathematical concepts 4. Demonstrate an understanding of mathematics and mathematical processes consistent with the syllabus. Reason logically and recognize incorrect reasoning. 5. Use mathematical terminology and formulae to communicate effectively to other technically literate people
Indicative Contents المحتويات الإرشادية	Integration: definition, graphical interpretation, relation to differentiation, definite and indefinite integrals, integration by substitution. The definite integral $\int_a^b f(x) dx$ of a nonnegative function $f(x)$ is the area of the region $a \leq x \leq b$ and $0 \leq y \leq f(x)$. The precise definition involves approximating this region by skinny rectangles. To find the arc length s of a curve by calculus we use the formula $s = \int ds$ To find the area of a plane figure by calculus we use the formula $A = \int dA.$

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 .
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Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	3	6% (6)	3,5, 10	LO #1, 2, 10 and 11
	Assignments	2	4% (4)	Continuous	LO # 3, 4, 6 and 7
	Projects / Lab. Report				
				13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
Week 1	Indefinite integrals of common functions Definite integrals of common functions
Week 2	Integrating using long division and completing the square Integrating using trigonometric identities
Week3	Integration by Inverse Substitution; Completing the Square
Week 4	Integration of $\ln x$, e^x , and Logarithmic Other Exponential and Logarithmic Functions
Week5	Methods of integration Integration by parts Odd and even powers of sine and cosine
Week6	Integrating with u-substitutions
Week 7	Partial fractions
Week 8	Trigonometric substitutions Integral involving $a x^2 + b x + c$
Week 9	Rational functions of $\sin x$ and $\cos x$, and other trigonometric integrals

Week 10	Application of integrals Lengths of Curves in the Plane Area of Surfaces of Revolution
Week 11	Areas between Curves
Week 12	Volumes of Solids of Revolution-Disks and Washers Cylindrical Shells-An Alternative to Washers
Week 13	Improper Integrals
Week14	Rule for approximating definite integral Trapezoidal rule
Week15	Simpson's rule
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus twelve edition	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

Second stage:

Module Information			
معلومات المادة الدراسية			
Module Title	Industrial Safety & Management		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory
Module Code	UOBAB0104044		<input type="checkbox"/> Lecture
ECTS Credits	4		<input type="checkbox"/> Lab
SWL (hr/sem)	100		<input type="checkbox"/> Tutorial
			<input type="checkbox"/> Practical
			<input type="checkbox"/> Seminar
Module Level	UGII	Semester of Delivery	4
Administering Department	CH	College	EN
Module Leader	Ameer Abdulrazzaq Abdul-lateef	e-mail	eng392.ameer.abdulrazzaq@uobabylon.edu.iq
Module Leader's Acad. Title	Assist. Lect.	Module Leader's Qualification	MSc
Module Tutor	N/A	e-mail	E-mail
Peer Reviewer Name	N/A	e-mail	E-mail
Scientific Committee Approval Date	07/06/2023	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims

أهداف المادة الدراسية

1. Understanding of Safety Principles: Students will develop a comprehensive understanding of safety principles applicable to industrial settings, with a specific focus on chemical engineering processes. This includes knowledge of hazard identification, risk assessment, and risk management techniques.
2. Regulations and Compliance: Students will learn about the relevant safety regulations and standards in the chemical industry, including local, national, and international regulations. They will understand the importance of compliance with these regulations and the consequences of non-compliance.
3. Process Safety Management: Students will gain knowledge of process safety management systems, which involve the identification, control, and mitigation of potential hazards associated with chemical processes. They will learn about methods such as hazard and operability studies (HAZOP), fault tree analysis, and safety instrumented systems.
4. Emergency Preparedness and Response: Students will learn how to develop emergency response plans and protocols to effectively handle emergencies and incidents in industrial settings. This includes understanding evacuation procedures, communication systems, and coordination with emergency services.
5. Safety Instrumentation: Students will understand the role of safety instrumentation and control systems in maintaining safe operations. They will learn about the design, installation, and maintenance of safety-related instruments, such as fire and gas detection systems, emergency shutdown systems, and relief devices.
6. Safety Culture and Human Factors: Students will explore the importance of fostering a strong safety culture within organizations. They will learn about human factors that can contribute to accidents, such as human error and fatigue, and strategies to mitigate these factors.
7. Risk Assessment and Management: Students will develop skills in conducting risk assessments and implementing risk management strategies for chemical engineering processes. This includes methods for identifying hazards, evaluating risks, and implementing control measures to reduce risks to acceptable levels.
8. Incident Investigation and Analysis: Students will learn techniques for investigating and analyzing incidents and near-misses in industrial settings. They will understand the importance of identifying root causes, developing

	<p>corrective actions, and implementing preventive measures to avoid future incidents.</p> <p>9. Safety Auditing and Inspection: Students will gain knowledge of safety auditing and inspection processes to assess compliance with safety standards and regulations. They will learn how to conduct safety audits, identify areas of improvement, and implement corrective actions.</p> <p>10. Ethical and Professional Responsibility: Students will develop an understanding of the ethical and professional responsibilities of chemical engineers in ensuring the safety of industrial processes. They will learn about professional codes of conduct and the importance of integrity, honesty, and transparency in safety management.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>1. Knowledge of Safety Principles: Demonstrate a deep understanding of safety principles applicable to industrial settings, including hazard identification, risk assessment, and risk management techniques.</p> <p>2. Compliance with Regulations: Understand and adhere to the relevant safety regulations and standards in the chemical industry, ensuring compliance and recognizing the consequences of non-compliance.</p> <p>3. Application of Process Safety Management: Apply process safety management systems, including hazard and operability studies (HAZOP), fault tree analysis, and safety instrumented systems, to identify, control, and mitigate potential hazards in chemical processes.</p> <p>4. Emergency Preparedness and Response: Develop effective emergency response plans and protocols for industrial settings, including evacuation procedures, communication systems, and coordination with emergency services.</p> <p>5. Proficiency in Safety Instrumentation: Design, install, and maintain safety-related instruments, such as fire and gas detection systems, emergency shutdown systems, and relief devices, to ensure safe operations.</p> <p>6. Cultivate Safety Culture: Foster a strong safety culture within organizations, understanding the importance of human factors, such as human error and fatigue, and implementing strategies to mitigate these factors.</p> <p>7. Risk Assessment and Management: Conduct risk assessments for chemical engineering processes, evaluating hazards, assessing risks, and implementing control measures to reduce risks to acceptable levels.</p> <p>8. Incident Investigation and Analysis: Investigate and analyze incidents and near-misses in industrial settings, identifying root causes, developing</p>

	<p>corrective actions, and implementing preventive measures to avoid future incidents.</p> <p>9. Conduct Safety Audits and Inspections: Perform safety audits and inspections to assess compliance with safety standards and regulations, identify areas for improvement, and implement corrective actions.</p> <p>10. Ethical and Professional Responsibility: Demonstrate ethical and professional responsibility in ensuring the safety of industrial processes, adhering to professional codes of conduct and promoting integrity, honesty, and transparency in safety management.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<ol style="list-style-type: none"> 1. Introduction to Industrial Safety: <ul style="list-style-type: none"> • Basic concepts and definitions of industrial safety • Historical incidents and their impact on safety regulations • Role of safety in chemical engineering processes 2. Hazard Identification and Risk Assessment: <ul style="list-style-type: none"> • Methods for identifying hazards in chemical processes • Risk assessment techniques, including qualitative and quantitative methods • Risk matrices and their application in risk assessment 3. Safety Regulations and Compliance: <ul style="list-style-type: none"> • Overview of local, national, and international safety regulations • Understanding regulatory agencies and their roles • Compliance requirements and consequences of non-compliance 4. Process Safety Management: <ul style="list-style-type: none"> • Principles and components of process safety management systems • Hazard and operability studies (HAZOP) and other process hazard analysis techniques • Safety instrumented systems and their design and implementation 5. Emergency Preparedness and Response: <ul style="list-style-type: none"> • Development of emergency response plans and procedures • Emergency communication systems and protocols

- Coordination with emergency services and mutual aid organizations

6. Safety Instrumentation and Control:

- Safety-related instrumentation and control systems in chemical processes
- Fire and gas detection systems and their design considerations
- Emergency shutdown systems and their operation

7. Human Factors and Safety Culture:

- Understanding human factors and their impact on safety
- Fatigue management and shift work considerations
- Building and fostering a strong safety culture within organizations

8. Risk Management and Control Measures:

- Methods for controlling and mitigating risks in chemical processes
- Safety hierarchy and the use of inherent safety principles
- Design considerations for process safety, including ventilation and containment systems

9. Incident Investigation and Analysis:

- Techniques for investigating incidents and near-misses
- Root cause analysis methods and tools
- Developing corrective actions and preventive measures

10. Safety Auditing and Inspection:

- Safety auditing and inspection processes and techniques
- Assessment of safety management systems and practices
- Implementation of corrective actions based on audit findings

11. Ethical and Professional Responsibility:

- Ethical considerations in safety management
- Professional codes of conduct and their application in safety practices
- Responsibilities of chemical engineers in ensuring safety

12. Case Studies and Best Practices:

- Analysis of real-life case studies and industrial incidents
- Examination of best practices in industrial safety management
- Lessons learned and continuous improvement in safety practices

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

When it comes to learning and teaching strategies for an Industrial Safety & Management course for chemical engineering, it is essential to focus on both theoretical knowledge and practical application. Here are some effective strategies for teaching and learning this course:

1. Theoretical Instruction:

- Lectures: Conduct interactive lectures to introduce theoretical concepts related to industrial safety and management. Use visual aids, case studies, and real-life examples to enhance understanding.
- Textbooks and Reference Materials: Provide recommended textbooks and reference materials that cover the fundamental principles and best practices of industrial safety and management.
- Presentations: Encourage students to create presentations on specific topics, such as hazard identification, risk assessment, safety regulations, emergency response, and safety management systems.

2. Practical Application:

- Field Visits: Organize visits to industrial plants or facilities where students can observe safety practices in real-life situations. This helps them understand the practical application of safety measures.
- Case Studies: Assign case studies that require students to analyze industrial accidents or safety challenges. This promotes critical thinking and problem-solving skills.

3. Group Discussions and Debates:

- Conduct group discussions and debates on safety-related topics. Encourage students to express their opinions, analyze different perspectives, and engage in healthy debates.

4. assignments and Assessments:

- Assign regular assignments, such as research papers, case studies, and problem-solving exercises, to reinforce learning and assess students' understanding.
- Conduct quizzes and examinations that evaluate both theoretical knowledge

and practical application of safety principles.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	
	Assignments	1	5% (5)	5	
	Projects / Lab.	0	0% (0)	0	
	Report	1	15% (10)	12	
Summative assessment	Midterm Exam	1.5 hr	15% (15)	7	
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Material Covered	
Week 1	Introduction to Industrial Safety <ul style="list-style-type: none"> Overview of industrial safety and its importance in chemical Laps Historical accidents and their impact on safety regulations Introduction to safety management systems
Week 2	Emergency Preparedness and Response <ul style="list-style-type: none"> Emergency planning and preparedness Emergency response procedures and protocols Case studies on effective emergency response and lessons learned from accidents

Week 3	Hazard Identification and Risk Assessment
Week 4	<ul style="list-style-type: none"> • Types of hazards in chemical engineering processes • Hazard identification techniques (e.g., HAZOP, FMEA) • Risk assessment methodologies (e.g., qualitative, semi-quantitative, quantitative)
Week 5	<p>Process Safety Management</p> <ul style="list-style-type: none"> • Elements and principles of process safety management • Process safety information and documentation • Process hazard analysis techniques
Week 6	<p>Safety Regulations and Standards</p> <ul style="list-style-type: none"> • Introduction to relevant safety regulations and standards (e.g., OSHA, EPA, NFPA) • Case studies on the consequences of non-compliance
Week 7	Safety Culture and Human Factors
Week 8	<ul style="list-style-type: none"> • Importance of safety culture in chemical engineering organizations • Human factors and their influence on safety performance • Training and communication strategies for promoting a strong safety culture
Week 9	Fire Safety and Explosion Protection
Week 10	<ul style="list-style-type: none"> • Fire protection systems and strategies • Explosion prevention and mitigation measures • Case studies on major industrial fires and explosions
Week 11	Mid-term Exam
Week 12	Occupational Health and Industrial Hygiene
Week 13	<ul style="list-style-type: none"> • Overview of occupational health hazards in chemical engineering • Industrial hygiene practices and exposure control • Personal protective equipment (PPE) selection and usage
Week 14	Report seminar and discussion
Week 15	<p>Environmental Safety and Sustainability</p> <ul style="list-style-type: none"> • Environmental regulations and their impact on chemical engineering operations • Hazardous waste management and pollution prevention • Sustainable practices for minimizing environmental impact
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Material Covered	
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Process Systems Risk Management, Ian Cameron, R. Raman, 2005	No
Recommended Texts	Design solutions for process equipment failures, center for chemical process safety of the American institute of chemical engineers	No
Websites	Different websites according to the newest cases	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Electrical engineering		Module Delivery	
Module Type			<input checked="" type="checkbox"/> Theory	
Module Code	CHME		<input type="checkbox"/> Lecture	
ECTS Credits	6		<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	60		<input type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGI	Semester of Delivery	2	
Administering Department	CH	College	EN	
Module Leader	Asst. Lec. Mays Khalid		e-mail	eng.mays.mohammed@uobabylon.edu.iq
Module Leader's Acad. Title	Asst. Lecturer	Module Leader's Qualification	master	
Module Tutor	-		e-mail	
Peer Reviewer Name	-		e-mail	-
Scientific Committee Approval Date	21/03/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The aim of this course is to give the student basic information about the elements of electrical circuits and the theories that are used in analyzing electrical circuits
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> Theoretical lectures Practical application in the laboratory of curriculum vocabulary. Using some general engineering principles that focus on analyzing and designing the engineering problem, in addition to using the laws and rules of electrical engineering in order to identify the source of the problem and solve it.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	60		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	Quizzes	2	10% (10)	4,7,10,13	LO #1, 2, 3, 7 and 8

assessment	Assignments	2	10% (10)	2, 4, 7, 9, 12	LO # 1,2, 3, 4, 5, 6 and 7
	Projects / Lab.	2	10% (10)	2,6,8,9,11,14, 15	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	10	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to electrical engineering
Week 2	Ohm law/ resistor
Week 3	Resistor in series and parallel
Week 4	quiz
Week 5	Inductor, capacitor
Week 6	Voltage divider theorem
Week 7	quiz
Week 8	Current divider theorem
Week 9	Kirchhoff's Law
Week 10	Midterm exam
Week 11	superposition theorem
Week 12	star and delta connection
Week 13	quiz
Week 14	Thevenin Theorem - Circuit Analysis.
Week 15	Norton Theorem - Circuit Analysis

Week 16	Final exam
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Ohm law
Week 2	Voltage divider theorem
Week 3	Current divider theorem
Week 4	Kirchhoff's Law
Week 5	superposition theorem
Week 6	Thevenin Theorem
Week 7	Norton Theorem

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electrical Engineering 101 – Darren Ashby	Yes
Recommended Texts	Engineering Circuit Analysis – William Hayt, Jack Kemmerly, Jamie Phillips and Steven Durbin	yes
Websites		

Grading Scheme

مخطط الدرجات

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

Module Information

معلومات المادة الدراسية

Module Title	Programing Engineering language1		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory	
Module Code	UoB12345		<input type="checkbox"/> Lecture	
ECTS Credits			<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	150		<input type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGI	Semester of Delivery	2	
Administering Department	CH	College	EN	
Module Leader	Ali obaid Imarah		e-mail	Aliumara@uobabylon.edu.ia
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	3/03/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims	11. Learn matlab programming
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أهداف المادة الدراسية	<p>12. Solving difficult problem in matlab programming.</p> <p>13. This is the basic fundamental of others programming language.</p> <p>14. To understand complex tools of matlab.</p> <p>Full course training in matlab programming</p>
Module Learning Outcomes	<p>To understand complex tools of matlab.</p> <p>Full course training in matlab programming</p>
مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.72
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.28
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	10	10% (10)	3,6,8, 11, 13	LO #1, 2, 3, 7 and 8
	Assignments	10	10% (10)	2, 4, 7, 9, 12	LO # 1,2, 3, 4, 5, 6 and 7
	Projects / Lab.	10	10% (10)		
	Report	1	10% (10)	13	LO # 5, 8 and 10

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Matlab Language Constants and variables . implementation
Week 2	arithmetic operations , library
Week 3	functions and priority of implementation
Week 4	input and output commands Input and output commands
Week 5	Controlling sentence
Week 6	IF...THEN...Else
Week 7	Nested if
Week 8	LOOP
Week 9	WHILE...statement WHILE...statement
Week 10	Application
Week 11	Nested loop
Week 12	Arrays: one-dimension Two dimension array
Week 13	Midterm exam
Week 14	Mathematical operation :addition, subtraction in 2Darry,
Week 15	Application
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	.	
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

Module Information

معلومات المادة الدراسية

Module Title	computer science 2		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0104043			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGI	Semester of Delivery		
Administering Department	CH	College	EN	

Module Leader	Ali obaid Imarah	e-mail	Aliumara@uobabylon.edu.ia
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	3/03/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 2. Learn artificial intelligent 3. Solving difficult problem in machine learning. 4. This is the basic fundamental of E -commerce.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>The student understands the topic</p> <p>1-Machine learning: This popular subset of AI is important because it powers many of our products and services today. Machines learn from data to make predictions and improve a product's performance.</p> <p>2- AI professionals need to know different algorithms, how they work, and when to apply them</p> <p>3- Basics of AI and programming</p>
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Your level of knowledge of artificial intelligence: Are you a true beginner? Do you have a foundation in math and statistical skills? Are you familiar with basic terminology and concepts?
	Your intention for learning: Are you pursuing a new career or just supplementing your current career?
	How much time you can spend learning: Are you currently employed? Do you want to learn AI?
	How do you want to learn?

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.72
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.28
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Introduction of AI, Definition AI ,History
Week 2	AI, Techniques and Approaches
Week 3	Application AI in internet
Week 4	AI and Matlab programming
Week 5	Functions in matlab programming
Week 6	Built in function and User function
Week 7	User define Function in matlab
Week 8	Application of user defined function
Week 9	Sub function and nested function programs
Week 10	Graphic introduction ,Basic graphics commands programs
Week 11	File I/O -Opening and Closing Files -Temporary Files and Directories
Week 12	Application of AI in matlab AI with image processing
Week 13	E commerce Concepts of electronic banking
Week 14	service:- ATM and debit card services Mobil Banking ,SMS Banking ,electronic alert
Week 15	Introduction Computer troubleshooting , common hardware Issues and solution ,diagnoses and repair
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	.	Yes
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

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

Module Information

معلومات المادة الدراسية

Module Title	Fluid Flow I		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code				
ECTS Credits				
SWL (hr/sem)	60			
Module Level	UGI	Semester of Delivery		
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Ahmed Saib Naji		e-mail	Ahmed.najial-alawi@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	None		e-mail	
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date	24/02/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<p>15. Understanding the physical properties of fluids</p> <p>16. Focus on the effect of fluid on rigid bodies.</p> <p>17. Learning about the fluid effect when it is at rest.</p> <p>18. Understanding the measuring of pressure by using manometers.</p> <p>19. Learning the principle of the Energy Equations and its applications.</p> <p>20. Understanding the fluid behavior through pipes and over plates.</p> <p>21. Investigating the effect of fluids flow over plates.</p> <p>22. Understanding the correlations and how to develop them.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>Learning the following:</p> <p>19. The properties of the fluids.</p> <p>20. The concepts of the manometers</p> <p>21. The energy equation in two forms.</p> <p>22. Analysis the fluids flow through pipes and over the plates</p> <p>23. The applications of dimensional analysis for experimental data.</p>
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following</p> <p><u>Review the fluids properties</u></p> <p>Static and moving fluids properties will be displayed firstly, analysis the effect of fluids on the rigid bodies such as plates in term of friction factor and shear stress.</p>

	<p>Finally, studying the manometers and how to use it in the measuring of the pressure drop between two ends. [16 hr].</p> <p><u>The energy equation</u> The applications of the manometers incorporated with the energy equation in both types (the ideal and the real) and their applications [16 hr].</p> <p><u>The internal Flow</u> Different types of fluids flow uniformities, calculate the velocity profiles, pressure drop and shear stress of the fluids flow through channels [12 hr]</p> <p><u>The External Flow</u> The main outcome of this chapter is the boundary layer derivations with respect to the flow patterns in case of laminar and turbulent flow, then calculate the pressure drop and the shear stress of the pipes and/or the plates walls [12 hr].</p> <p><u>The Dimensional Analysis</u> Reducing the numbers of experiments and period of develop the equations those correlating the experimental variables [4 hr].</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>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 In addition to encouraging the students to involve in teamwork in order to achieve the experience and share their knowledge with classmates.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	4,8,11, 14, 15	
	Classwork assign.	5	10% (10)	4,8, 11,14, 15	
	Homework assign.	5	10% (10)	,48, 11, 14,15	
	Report	1	10% (10)	15	
Summative assessment	Midterm Exam	1.5 hr	10% (10)	11	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Review the fluid properties
Week 2	Review the fluid properties
Week 3	Review the fluid properties
Week 4	Review the fluid properties
Week 5	The Energy Equation
Week 6	The Energy Equation
Week 7	The Energy Equation
Week 8	The Energy Equation
Week 9	The internal Flow

Week 10	The internal Flow
Week 11	MidExam + The internal Flow
Week 12	The external Flow
Week 13	The external Flow
Week 14	The external Flow
Week 15	The Dimensional Analysis
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	N/A
Week 2	N/A
Week 3	N/A
Week 4	N/A
Week 5	N/A
Week 6	N/A
Week 7	N/A

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fluid Flow for Chemical Engineering by F. Holland and R. Bragg	Yes
Recommended Texts	1) Fluid Mechanics by Donald Fox 2) Fluid Mechanics by Manson	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Fluid Flow II		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ECHE221			
ECTS Credits				
SWL (hr/sem)	45			
Module Level	UGI	Semester of Delivery		
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Ahmed Saib Naji		e-mail	Ahmed.najial-alawi@uobabylon.edu.iq

Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	24/02/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. Analysis the problems with the fluid flow in term of momentum and energy equations. 2. Focus the energy equation applications in non-Newtonian fluids flow 3. Understanding the ideas about selection of the correct turbomachinery. 4. Understanding the differences between the compressible and incompressible fluid flow 5. Take knowledge in the mixing equipment and its design. 6. Knowing about the fluid with high speed of flow
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. How to analysis systems in stationary and moving configurations. 2. Identify the differences between the Newtonian and non-Newtonian fluids and what are their behaviors. 3. Knowing the turbo machinery systems design and how to select suitable pumps for any applications. 4. Getting good knowledge about mixing and their types with designs. 5. Identify the compressible fluids flow and how to calculate the physical

	properties of the bodies with high speed.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following <u>Reynolds Transport Theorem</u> Derivation principle of this theorem, applications for stationary control volume and moving type also, applications to the continuity, momentum and energy equations and lastly how to analysis the problems with respect to the application. [12 hrs]
	<u>Non Newtonian Fluid Flow.</u> Review about the viscosity of the fluids then classification of the fluids. Learning the suitable equations of the velocity profile and pressure drop for non Newtonian fluids flow. Finally, solving the energy equation for non Newtonian fluids flow in pipes. [9 hrs]
	<u>Turbo machinery</u> Classify the various types of turbo machinery and define the working fluids. Look at the types of pumps and turbines, studying the calculations about the valid selection of the pumps and how to use them correctly and safely. Design the operation system in parallel, series and mixing configuration. [12 hr].
	<u>The mixing</u> Classify the different types of agitators and the benefits of using each one. Study the design of each one and look at the way the use them and finally calculate the suitable power for the mixer. [3 hr].
	<u>The compressible Fluids Flow</u> Identify the types of flow with respect to the speed of sound, look at the thermodynamics cases with compressible fluids flow [9 hr]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage
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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 In addition to encouraging the students to involve in teamwork in order to achieve the experience and share their knowledge with classmates.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	80	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/N umber	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	4,8,11, 14, 15	
	Classwork assign.	5	10% (10)	4,8, 11,14, 15	
	Homework assign.	5	10% (10)	,48, 11, 14,15	
	Report	1	10% (10)	15	
Summative assessment	Midterm Exam	1.5 hr	10% (10)	13	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Material Covered	
Week 1	Reynolds Transport Theorem
Week 2	Reynolds Transport Theorem

Week 3	Reynolds Transport Theorem
Week 4	Reynolds Transport Theorem
Week 5	The non-Newtonian Fluids Flow
Week 6	The non-Newtonian Fluids Flow
Week 7	The non-Newtonian Fluids Flow
Week 8	Turbo Machinery
Week 9	Turbo Machinery
Week 10	Turbo Machinery
Week 11	Turbo Machinery
Week 12	The mixing
Week 13	MidExam + Compressible Fluids Flow
Week 14	Compressible Fluids Flow
Week 15	Compressible Fluids Flow
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Impact of jets
Week 2	Manometers
Week 3	Bernoulli Equations
Week 4	Friction Factor
Week 5	Discharge through orifices

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fluid Flow for Chemical Engineering by F. Holland and R. Bragg	Yes
Recommended Texts	1) Fluid Mechanics by Donald Fox 2) Fluid Mechanics by Manson	No
Websites		

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

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

Module Information معلومات المادة الدراسية		
Module Title	Physical Chemistry	Module Delivery
Module Type	Core	<input checked="" type="checkbox"/> Theory
Module Code	ENCHPc2 14 02	<input type="checkbox"/> Lecture
ECTS Credits	6	<input checked="" type="checkbox"/> Lab
SWL (hr/sem)	150	

		<input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Level	UGIII	Semester of Delivery	5
Administering Department	Chemical Engineering	College	College of Engineering
Module Leader	Hayfaa adnan	e-mail	Haifaadnan_81@uobabylon.edu.iq
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D.
Module Tutor	Hayfaa adnan	e-mail	Haifaadnan_81@uobabylon.edu.iq
Peer Reviewer Name	n.a.	e-mail	n.a.
Scientific Committee Approval Date	/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	23. To introduce the fundamental principles and theories of Physical Chemistry 24. To provide students with Expression of concentration . 25. To enhance problem-solving and analytical skills related to Physical Chemistry 26. To encourage critical thinking and the ability to apply Physical Chemistry
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	concepts to real-world engineering problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	24. Demonstrate a solid understanding of the fundamental principles and theories of Physical Chemistry 25. Communicate effectively, both orally and in writing, about Physical Chemistry concepts and solutions 26. involves study of gases and thermodynamics.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Physical Chemistry and their uses, • Definition aGas behavior [3hrs] • The kinetic theory of gases, [3hrs] • First law of thermodynamics [5hrs] • , Second and Third law of thermodynamics[7 hrs] • Thermo chemistry [4hrs] • Solution, Property of dilute solution (collogative properties) [5hrs] • Chemical equilibria [5hrs] • Chemical equilibria [5hrs] Electromotive force. [8 hrs] Principles of colloids.[8 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of Physical Chemistry . The lectures will provide a theoretical foundation and present key concepts and equations. Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve Physical Chemistry problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of heat transfer concepts.
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Laboratory Sessions: Practical laboratory sessions will be conducted to allow students to determination boiling point and melting point and purification . These sessions will help students develop practical skills and relate theory to real-world applications.

Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Gas behavior
Week 2	The kinetic theory of gases
Week 3	First law of thermodynamics
Week 4	Second and Third law of thermodynamics
Week 5	Second and Third law of thermodynamics
Week 6	Solution
Week 7	Exam 1
Week 8	Chemical equilibria,
Week 9	Chemical equilibria
Week 10	Electromotive force
Week 11	Principles of colloids
Week 12	Property of dilute solution
Week 13	colligative properties
Week 14	Surface chemistry
Week 15	Exam 2

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: diffusion of gases
Week 4	Lab 2: determination density of liquid
Week 7	Lab 3: determination of viscosity of a liquid. determination of heat of solution
Week 10	Lab 4: determination of calorimetric constant, determination of heat neutralization

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	https://www.google.iq/search?sa=X&hl=en&tbm=bks&tbm=bks&q=inauthor:%22Robert+T.+Morrison%22&ved=2ahUKEwjHsc3XycP_AhVgR_EDHSM3BKgQ9Ah6BAgPEAQ	Yes
Recommended Texts	https://www.google.iq/search?sa=X&hl=en&tbm=bks&tbm=bks&q=inauthor:%22Robert+T.+Morrison%22&ved=2ahUKEwjHsc3XycP_AhVgR_EDHSM3BKgQ9Ah6BAgPEAQ	No
Websites	https://www.google.iq/search?sa=X&hl=en&tbm=bks&tbm=bks&q=inauthor:%22Robert+T.+Morrison%22&ved=2ahUKEwjHsc3XycP_AhVgR_EDHSM3BKgQ9Ah6BAgPEAQ	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Mathematics III		Module Delivery	
Module Type	Supplementary		<input checked="" type="checkbox"/> Theory	
Module Code	ENCHMaIII2 13 01		<input checked="" type="checkbox"/> Lecture	
ECTS Credits	6		<input type="checkbox"/> Lab	
SWL (hr/sem)	150		<input checked="" type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGII	Semester of Delivery	3	
Administering Department	Chemical Eng.	College	College of Engineering	
Module Leader	Ali Safa Nouri Alsaegh	e-mail	alsaeghali@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	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mathematics II	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims</p> <p>أهداف المادة الدراسية</p>	<p>27. To provide a comprehensive understanding of linear algebra and its relevance to engineering systems.</p> <p>28. To introduce students to vector calculus and its application in solving engineering problems.</p> <p>29. To introduce students to vector function and its application in solving engineering problems.</p> <p>30. To enhance problem-solving skills by applying advanced mathematical concepts to real-world engineering scenarios.</p> <p>31. To foster critical thinking and analytical abilities necessary for advanced engineering courses.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Upon successful completion of this module, students will be able to:</p> <ul style="list-style-type: none">• Demonstrate a comprehensive understanding of basic concepts in linear algebra.• Apply matrix operations to solve systems of linear equations.• Understand and apply vector calculus concepts, including vector differentiation and integration, to engineering problems.• Apply vector calculus concepts to solve problems related to engineering fields such as fluid dynamics, electromagnetism, and solid mechanics.• Utilize eigenvalues and eigenvectors for engineering applications.• Apply linear transformations to solve engineering problems.• Learn how to work on Functions of Two or More Variables and Their Derivatives• To foster critical thinking and analytical abilities necessary for advanced engineering courses.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>1. Vectors and Analytic Geometry in Space:</p> <ul style="list-style-type: none">• Vectors in the Plane• Cartesian (Rectangular) Coordinates• Vectors in Space• Dot Products, Cross Products

	<ul style="list-style-type: none"> • Lines and Planes in Space <p>2. Vector-Valued Functions and Motion in Space:</p> <ul style="list-style-type: none"> • Vector-Valued Functions and Curves in Space. • Vector-Valued Functions Derivatives and Integrals • Modeling Projectile Motion • Directed Distance and the Unit Tangent Vector • Curvature, Torsion, and the TNB Frame <p>3. Polar Coordinates:</p> <ul style="list-style-type: none"> • Graphing in Polar Coordinates, Integration in Polar Coordinates System • Area in the plan , Area between two polar curves , Area of a surface of revolution <p>4. Functions of Two or More Variables and Their Derivatives:</p> <ul style="list-style-type: none"> • Partial Derivatives, The Chain Rule • Directional Derivatives and Gradient Vectors • Tangent Planes and Normal Lines • Linearization and Differentials • Maxima, Minima, and Saddle Points, Lagrange Multipliers
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ul style="list-style-type: none"> • Lectures by experienced faculty members • Tutorials and problem-solving sessions • Case studies and real-world applications • Group discussions and collaborative learning • Independent study and self-assessment
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.12
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.88

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150
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Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Vectors and Analytic Geometry in Space: Definition, Properties, Special Matrices, Determinants, Inverse matrix, System of Linear Equation, Matrix Eigen Values Problem.
Week 2	Vectors and Analytic Geometry in Space: Vectors in the Plane, Cartesian (Rectangular) Coordinates. Vectors in Space, Dot Products, Cross Products.
Week 3	Vectors and Analytic Geometry in Space: Lines and Planes in Space.
Week 4	Tutorial
Week 5	Vector-Valued Functions and Motion in Space: Vector-Valued Functions and Curves in Space. Derivatives and Integrals.
Week 6	Vector-Valued Functions and Motion in Space: Modeling Projectile Motion, Directed Distance and the Unit Tangent Vector.
Week 7	Vector-Valued Functions and Motion in Space: Curvature, Torsion, and the TNB Frame.
Week 8	Polar Coordinates: Graphing in Polar Coordinates, Integration in Polar Coordinates System, Area in

	the plan , Area between two polar curves , Area of a surface of revolution.
Week 9	Tutorial
Week 10	Functions of Two or More Variables and Their Derivatives: Partial Derivatives, The Chain Rule.
Week 11	Functions of Two or More Variables and Their Derivatives: Directional Derivatives and Gradient Vectors.
Week 12	Functions of Two or More Variables and Their Derivatives: Tangent Planes and Normal Lines.
Week 13	Functions of Two or More Variables and Their Derivatives: Linearization and Differentials.
Week 14	Functions of Two or More Variables and Their Derivatives: Maxima, Minima, and Saddle Points , Lagrange Multipliers.
Week 15	Tutorial
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	George B. Thomas, Jr. "THOMAS' CALCULUS ", 13 th edition, 2013	Yes

Recommended Texts	B.S. Grewal, "Higher Engineering Mathematics" 42nd edition.	No
Websites	https://www.khanacademy.org/	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Mathematics IV	Module Delivery
Module Type	Supplementary	<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ENCHMaIV2 13 07	
ECTS Credits	6	
SWL (hr/sem)	150	

Module Level	UGII	Semester of Delivery	4
Administering Department	Chemical Eng.	College	College of Engineering
Module Leader	Ali Safa Nouri Alsaegh	e-mail	alsaeghali@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	01/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mathematics III	Semester	3
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. To provide a comprehensive understanding of linear algebra and its relevance to engineering systems. 2. To enhance problem-solving skills by applying advanced mathematical concepts to real-world engineering scenarios. 3. To develop a deep understanding of differential equations and their applications in engineering. 4. To foster critical thinking and analytical abilities necessary for advanced engineering courses.
Module Learning	<p>Upon successful completion of this module, students will be able to:</p> <ul style="list-style-type: none"> • To develop a deep understanding of binary and triple integrations and other

<p>Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>integrals and on the different axes.</p> <ul style="list-style-type: none"> • To develop a deep understanding of differential equations and their applications in engineering. • Understand the concepts of infinite sequences and infinite series. • Determine the convergence or divergence of infinite sequences and series. • Apply convergence tests to determine the convergence or divergence of series. • Understand and apply Taylor and Maclaurin series expansions. • Use power series to approximate functions and solve engineering problems. • To foster critical thinking and analytical abilities necessary for advanced engineering courses.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<ol style="list-style-type: none"> 1. Multiple Integrals : <ul style="list-style-type: none"> • Double Integrals, Double Integrals in Polar Form • Area, Moments, and Centers of Mass • Triple Integrals in Rectangular Coordinates Volumes and Average Values • Masses and Moments in Three Dimensions • Triple Integrals in Cylindrical and Spherical Coordinates 2. Ordinary Differential Equation: <ul style="list-style-type: none"> • Definition, Type, Order, Degree, • First order Ordinary Differential Equation (Separable Variable Equation, Homogeneous Equation, Linear Differential Equation, Exact Equation) • Second Order Differential Equation, Homogeneous Second Order, Non-Homogeneous Second Order (Undetermined Coefficients, Variation of Parameters) 3. Infinite sequences and infinite series: <ul style="list-style-type: none"> • Sequences • infinite series, • Comparison and Integral Tests • Absolute Convergence; The Ratio and Root Tests • Alternating Series and Conditional Convergence • Power series, Taylor Series and Maclaurin Series.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ul style="list-style-type: none"> • Lectures by experienced faculty members • Tutorials and problem-solving sessions • Case studies and real-world applications • Group discussions and collaborative learning • Independent study and self-assessment
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.12
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.88
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Material Covered

Week 1	Multiple Integrals: Double Integrals , Area, Moments, and Centers of Mass , Double Integrals in Polar Form.
Week 2	Multiple Integrals: Triple Integrals in Rectangular Coordinates Volumes and Average Values.
Week 3	Multiple Integrals: Masses and Moments in Three Dimensions.
Week 4	Multiple Integrals: Triple Integrals in Cylindrical and Spherical Coordinates , Substitutions in Multiple Integrals.
Week 5	Tutorial
Week 6	Ordinary Differential Equation: Definition, Type, Order, Degree.
Week 7	Ordinary Differential Equation: First order Ordinary Differential Equation (Separable Variable Equation, Homogeneous Equation, Linear Differential Equation.
Week 8	Ordinary Differential Equation: Exact Equation, Second Order Differential Equation, Homogeneous Second Order.
Week 9	Ordinary Differential Equation : Non-Homogeneous Second Order (Undetermined Coefficients, Variation of Parameters).
Week 10	Tutorial
Week 11	Infinite sequences and infinite series: sequences and infinite series.
Week 12	Infinite sequences and infinite series: Comparison and Integral Tests, Absolute Convergence; The Ratio and Root Tests.
Week 13	Infinite sequences and infinite series: Alternating Series and Conditional Convergence.
Week 14	Infinite sequences and infinite series: Power series , Taylor Series and Maclaurin Series.
Week 15	Tutorial
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	George B. Thomas, Jr. "THOMAS' CALCULUS ", 13 th edition, 2013	Yes
Recommended Texts	B.S. Grewal, "Higher Engineering Mathematics" 42nd edition.	No
Websites	https://www.khanacademy.org/	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	MATERIAL ENGINEERING		Module Delivery	
Module Type	Support		<input checked="" type="checkbox"/> Theory	
Module Code	ENCHEm2 17 05		<input checked="" type="checkbox"/> Lecture	
ECTS Credits	5		<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	125		<input type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGII	Semester of Delivery	3	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Haneen Zuhair Naji	e-mail	Eng.haneen.zuhair@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor	None	e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	07/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<p>32. To learn the atomic structure and subatomic bondings.</p> <p>33. To know the types of materials and the main differences between them.</p> <p>34. To learn the different types of crystal structure of metals and ceramics materials.</p> <p>35. To learn the defects in crystal structure and its effect on materials properties.</p> <p>36. To study the role of phase diagram and types of phase diagram.</p> <p>37. To study the polymeric materials and its type.</p> <p>38. To study composites materials and its type.</p> <p>39. To study advanced materials such as biomaterials, smart materials and nanoengineered materials.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>27. Identify the atomic structure of materials and subatomic bonding.</p> <p>28. List the types of engineering materials and its branches relating to advance materials</p> <p>29. The student will be familiar with the crystalline and amorphous materials.</p> <p>30. The student is familiar with ceramics materials.</p> <p>31. The student will be able to know the types of phase diagram for metals and compound.</p> <p>32. Identify the materials imperfections and their types and reasons.</p> <p>33. Students will be able to know the polymeric materials and its structure.</p> <p>34. Students will be able to know advanced materials and some of their important application</p> <p>35. Define and learn the nanoengineered materials and its type.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Atomic structure and subatomic bonding</u></p>

Atomic structure, Electrons and nucleus, proton and neutron, electron configuration, atomic weight and atomic number, Types of bonding, types of primary bonding's and secondary bonding, discussion of chapter problems. [3 hrs]

Types of Materials and its crystal structure.

Types of materials, metals, ceramics, polymeric materials and composites materials, types of crystal structures of metals, FCC, BCC, HCB, Atomic packing factor. Discussion and solve chapter problems. [9 hrs]

Defect in metals structure.

Types of Point defect, line defect, surface defect, calculate defect density , discussions and solve problems of chapter. (4 hrs)

Phase diagram.

Types of phase diagram, uniary phase diagram, binary phase diagram. Discussion and solve problem of chapter. [9 hrs]

Ceramic materials:

Introduction to ceramic materials, types of ceramic material structure, defect in ceramic materials, calculate of APF and density of ceramic materials. Discussion and problems of chapter. [7 hrs]

Polymer materials

Structure of polymers materials, types of polymer materials, properties of polymer materials, thermoplastic and thermosetting materials, copolymer polymers, types of copolymer polymers, discussion and problems of chapter. [9 hrs]

Composite materials:

Types of composites materials, ceramic composite materials, polymeric composites materials and metals composite materials. [3 hrs]

Nanoengineered materials

Nanoscience and nanoengineered materials, Types of nanoengineered materials. [3 hrs]

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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. In addition to encouraging the students to involve in teamwork in order to achieve the experience and share their knowledge with classmates.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	2,3, 4,6,12	LO #1, 2, 3,9 and 11
	Assignments	6	10% (10)	2, 3, 4, 5,10, 12	LO # 1,2, 3, 4, 6 and 9 and 11
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 12, 13, and 14

Summative assessment	Midterm Exam	2 hr	10% (10)	7 and 10	LO # 1-7 and 7-15
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Atomic structure and subatomic bonding
Week 2	Types of materials
Week 3	Crystal structure metals
Week 4	Measurements of theoretical density and APF in crystalline materials
Week 5	Defect and imperfection in crystalline structure
Week 6	Phase diagram, one-component phase diagram
Week 7	Binary phase diagram
Week 8	Introduction to Ceramic Materials
Week 9	Imperfection in crystalline ceramics materials
Week 10	Mid term Exam
Week 11	Polymer materials
Week 12	Copolymer polymers
Week 13	Composite materials
Week 14	Nanoengineered Materials
Week 15	Application and properties of nanomaterials
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Cooling Curve

Week 2	Lab 2: Hardness measurements using Brinell method
Week 3	Lab 3: Hardness measurements using Vickers method
Week 4	Lab 4: Preparation of sample for optical microscopic investigation
Week 5	Lab 5: Structure observation under optical microscopic
Week 6	Lab 6: Investigate structure of different materials using optical microscopic
Week 7	Lab 7: Density measurements

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	. Materials science and engineering an introduction,7th edition,2007, Callister.	Yes
Recommended Texts	1) Science of materials engineering, Askeland, 2012 2)Ashby, M.F." 2 An Introduction to Microstructure, Processing and design " 2th 1999 Engineering Materials	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Petroleum and Natural gas Properties	Module Delivery	
Module Type	Core	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0104045		
ECTS Credits	5		
SWL (hr/sem)	175		
Module Level	UGII	Semester of Delivery	4
Administering Department	CH	College	EN
Module Leader	Hameed Hussein Alwan	e-mail	hameed@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.
Module Tutor	N/A	e-mail	E-mail
Peer Reviewer Name	N/A	e-mail	E-mail
Scientific Committee Approval Date	07/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. Recognizing the physical properties of petroleum and crude oil. 2. Understanding the chemical properties of petroleum and crude oil. 3. Learning the difference between acute and chronic toxicity. 4. Understanding enthalpy and what positive and negative values mean. 5. Analyzing the various uses of petroleum. 6. Recognizing the origin and base of crude oil (Organic and Inorganic theory) 7. Evaluation the crude oil .
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<ul style="list-style-type: none"> • Theories of genesis of crude oil (Organic and Inorganic theory) • Theoretical background about different distillation curves. • Hydrocarbons and non-hydrocarbons compounds, classification of crude oil according to type and by some characterization methods. • Crude oil products and its physical and chemical properties.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following. The basic of crude oil is required to know because it is crucial factor for designing and operation of fraction towers [6] pretreatment of crude oil at the front end of the refineries is the pretreatment of crude oil such as desalting of crude oil. [5 hrs] Fractionation crude oil or separation step in which the crude oil converted to its fractions (products). The student should know that physical separation for crude oil can be divided into two steps: the distillation under atmospheric pressure and under vacuum pressure. [5 hrs] The knowledge of the furnace design and reflux types to control the fractionation efficiency. [10 hrs] The estimation of top and side stream temperature for different products is a good factor need to student focused on it [6 hrs] Upgrading the different products such as coking, thermal treatment, isomerization and catalytic cracking and so on [25 hr] Blending of products to produce it according to suitable and required properties [5]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Petroleum , importance , composition, origin
Week 2	Hydrocarbons components
Week 3	Non hydrocarbon components
Week 4	Evaluation of crude oil
Week 5	Petroleum analysis
Week 6	Physical properties part 1
Week 7	Physical properties part 2
Week 8	Fractional distillation of crude oil
Week 9	Technical properties part 1
Week 10	Technical properties part 2
Week 11	Chemical processing technology –part1
Week 12	Chemical processing technology –part2
Week 13	Petroleum gas

Week 14	chemical and physical properties
Week 15	Natural gas dehydration
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-2	Specific gravity and API
Week 3-4	Viscosity and viscosity index
Week 5-6	Simple distillation ASTM
Week 6-8	Fractionation distillation TBP
Week 9-10	Flash point
Week 10-12	Smoke point
Week 13-15	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<ul style="list-style-type: none"> Nelson ,W.L. Petroleum Refinery Engineering , McGraw Hill publishing company limited, 1958 Fahim M.A. , Fundamentals of Petroleum Refining , first edition , Elsvier -2010 	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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Module Information

معلومات المادة الدراسية

Module Title	New headway pre-intermediate		Module Delivery	
Module Type			<input checked="" type="checkbox"/> Theory	
Module Code			Lecture	
ECTS Credits			Lab	
SWL (hr/sem)			<input type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	1	Semester of Delivery	1	
Administering Department	Mechanical Engineering	College	College of Engineer	
Module Leader	Nisreen Jasim HUssien	e-mail	eng.nasren.jassimab@uobabylon.edu.iq	
Module Leader's Acad. Title	Asst.lect	Module Leader's Qualification	Master	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
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Co-requisites module	None	Semester	
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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<p>40. To improve English Language skills and understanding the differences between tenses</p> <p>41. To understand the written text and able to use skimming, scanning skills.</p> <p>42. To prepare every topic through and get knowledge on way of conducting various tasks.</p> <p>43. To motivate students by conducting seminars, workshops, events, guest lectures, and competitions on English language frequently.</p> <p>44. To enable the students comprehend the spoken form of language</p> <p>45. To develop listening skills. Listening is the basis to learn any language. No one can speak second language without listening.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>36. To know language means to understand and speak the language.</p> <p>37. Encourages to participate in Role-play which is one of the effective methods for language learning. It develops thinking skills and spontaneity.</p> <p>38. They can improve their communicative functions or conversational skills like greeting, asking and giving.... Etc.</p> <p>39. Individualized English language instruction in a small- classroom setting, welcoming, inclusive, and friendly cultural environment.</p> <p>40. Bringing valuable and diverse international student perspectives to the university.</p> <p>41. Emphasize and facilitate the growth of critical thinking skills for students</p> <p>42. Promote the consistent use of English both inside and outside of the classroom.</p> <p>43. Support the university's various international initiatives with English language</p>

	<p>training and cultural expertise.</p> <p>44. Communicate with English speakers, to acquire the linguistic skills necessary for various life situations.</p> <p>45. Expanding student's vocabulary. Individual words do not constitute vocabulary. Idioms, collocations, and lexical phrases are also included.</p> <p>46. Try understanding native speakers.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part 1</u></p> <p>Recognizing tenses. Correcting mistakes and making questions with auxiliaries. (2hrs)</p> <p>Spelling of the present participle (2hrs)</p> <p>Choosing the right verb and forming the past continuous (2hrs)</p> <p>Spelling of plural nouns. Listening. (3hrs)</p> <p>Offers and decisions. listening (3hrs)</p> <p>Opposite adjectives. Making sentences about you(2hrs)</p> <p><u>Part 2</u></p> <p>Writing relative clauses. Reading and writing (3 hrs)</p> <p>Making positive and negative sentences. Writing (2hrs)</p> <p>Joining sentences, choosing the correct conjunction. Writing composition. (3hrs)</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage
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students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, considering type of simple experiments involving some sampling activities that are interesting to the students. Also, the other strategy is to make mistakes and try new things out, mistakes are an essential part of learning a language. To become a better speaker, you have to speak, even if you make lots of mistakes. And finally, focusing on listening. Listening turns out to be a really effective way to learn a language.

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Tenses. Question form. Vocabulary. Writing
Week 2	Present simple, continuous (have, have got) vocabulary
Week 3	Past simple
Week 4	Count and un count nouns. Expressions of quantity. Articles.
Week 5	Verb patterns
Week 6	Comparative and superlatives
Week 7	Mid-term Exam
Week 8	Present perfect. Tense revision
Week 9	Modals (should, must)
Week 10	Conditional clauses. Time clauses.
Week 11	Verb patterns (used to) infinitives.
Week 12	The passive
Week 13	Second conditional (might)
Week 14	Present perfect simple
Week 15	Reported statements
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	There is no lab
Week 1	
Week 2	
Week 3	
Week 4	

Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of English language teaching. New Head way Plus. John and Liz Soars. Pre-intermediate student's Book	yes
Recommended Texts	Translation	No
Websites	https://www.hiapkdownload.com/new-headway-pre-intermediate-student-book/com.newheaway231564/	

Grading Scheme

مخطط الدرجات

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

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

Third Stage:-

Module Information

معلومات المادة الدراسية

Module Title	<u>Thermodynamics I</u>		Module Delivery	
Module Type	<u>Core</u>		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	<u>ENCHTh3 23 05</u>			
ECTS Credits	<u>5.00</u>			
SWL (hr/sem)	<u>125</u>			
Module Level	UGIII	Semester of Delivery		
Administering Department	ENCH	College	ENG	
Module Leader	Alaa N. Ghanim		e-mail	eng.alaaghanim@uobabylon.edu.iq
Module Leader's Acad. Title	Professor		Module Leader's Qualification	M. Sc.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	01/06/2026	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims	
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<p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. To develop solving skills and understanding of problems involve mass and heat transfer in open and closed systems. 2. To understand the forms of energy of all kinds and its transformation into work according to the first, second and third laws. 3. To know the basic concepts of reversible and irreversible processes, and the application of two phase systems. 4. To calculate thermodynamic properties, (i.g., the enthalpy and entropy) of ideal and real of pure gaseous, liquid and solid materials, as well as gaseous mixtures and liquid solutions. 5. To understand the principle of heat engines, heat pumps, entropy evaluation of heat transfer systems, and the lost work. 6. To perform thermal calculations of heat capacity variation with temperature, heat of formation and standard and industrial chemical reactions. 7. To discuss generalized correlation of pure gas, mixture of gases, and liquids. 8. To understand PVT relationships using Maxwell thermodynamic partial relations and its derivation.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Understand how energy could be converted from one form to another and how the heat can be converted into useful work. 2. Discuss different equations of state that associated PVT relations of real gas. 3. Identify the statements and the expressions of the laws of thermodynamics I, II and III and their applications. 4. Summarize the heat of chemical reaction required for standard and industrial processes. 5. Describe the application of the second law of thermodynamic to ideal gas processes and entropy estimation. 6. Explain the thermal efficiency of heat engines, heat pumps, and analysis the entropy of cycles. 7. Understand the thermodynamics Pressure-Volume-Temperature relations and their derivations. 8. Define the latent heat of vaporization using Clapeyron equation. 9. Discuss thermodynamic partial derivative using Maxwell relations.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A - Thermodynamics Theory</u></p> <p>Fundamental. Work, Energy, system and surrounding, Reversible and irreversible, Two phase system, State function, Steam tables, Property diagrams, Heat capacity, Heat of formation, Heat of reaction. [10 hrs]</p> <p>Second law of thermodynamics, Carnot cycle, Entropy and the 2nd law, Entropy change of ideal gas, Evaluation of entropy, Heat Engine and Heat Pump. PVT relationship, Volumetric properties of pure fluid, Ideal gas, Law of corresponding states, Generalized correlation of gases, PVT relations of liquid, Generalized correlation of liquids. [10 hrs]</p> <p>Generalized virial correlations, Mixture of gases, Heat Effect and phase change, Clapeyron equation, Thermodynamic properties of fluid, Thermodynamic relations, and Maxwell relations. [10 hrs]</p>

	<p><u>Part B – Thermodynamics Tutorial (Exercises)</u></p> <p>Introduction, The First Law of Thermodynamics, The Ideal Gas, Two Phase System, Heat of Reactions. [5 hrs]</p> <p>The second Law of Thermodynamics, Entropy and The Second Law, PVT relationships, Behavior of Real Gas . [5 hrs]</p> <p>PVT Relations of Liquid, Gas Mixture, Heat Effect with Phase Change, Thermodynamic Relations. [5 hrs]</p>
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<h2>Learning and Teaching Strategies</h2> <h3>استراتيجيات التعلم والتعليم</h3>	
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Strategies	<p>This will be achieved through classes, interactive tutorials and by considering type of examples involving some sampling activities that are interesting to students.</p> <ol style="list-style-type: none"> 1. Acquire skill in the applications of the first law of thermodynamics for mechanical flow and non-flow processes with mass and heat transfer. 2. Acquire skill in the applications of the second law in calculating the efficiency of heat engines and steam power plants as well as heat transfer systems. 3. Acquires skill in solving problem calculations and evaluating the heat of chemical reaction required for standard and industrial processes. 4. Acquire skill in evaluating the thermal efficiency of heat engines, heat pumps, and entropy estimation of heat transfer systems, and the lost work. 5. Acquire skills in pressure-volume-temperature relations for systems of pure gas and mixture of gases using generalized Pitzer correlations and Virial correlations. 6. Acquire skill in estimation of heat effect and phase change of systems to predict the latent heat of vaporization. 7. Acquire skill in the prediction of partial derivatives of PVT Maxwell relation. <p>The main strategy that will be adopted in delivering this module is to encourage students' participation in solving exercises, while at the same time refining and expanding their critical thinking skills using the following methods.</p> <ol style="list-style-type: none"> 1- Using lectures and presentation through LCD with aid of theoretical and practical examples. 2- Conducting intellectual discussions and making participations for students. 3- Team groups to solve thermodynamics exercises and problems.
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<h2>Student Workload (SWL)</h2> <h3>الحمل الدراسي للطالب</h3>	
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Structured SWL (h/sem)	63	Structured SWL (h/w)	4.0
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الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - scope of thermodynamics, dimensions and unit, force, temperature, volume, pressure
Week 2	work, energy, internal energy and enthalpy, system and surrounding, state functions
Week 3	the first law statement, steady state, non-flow systems, steady state flow systems, the reversible and irreversible processes
Week 4	closed system processes, isometric process, isothermal process, isobaric process, adiabatic process, polytropic process
Week 5	equilibrium of two phase system, property diagrams, steam tables, application
Week 6	the flow work, heat capacity, effect of temperature on heat capacity for ideal gas
Week 7	the standard heat of formation, the standard heat of reactions, effect of temperature on the standard heat of reaction
Week 8	statement of the second law, Carnot cycle, entropy and the second law
Week 9	entropy change of ideal gas, evaluation of entropy, heat engine and heat pump, entropy change of ideal gas, evaluation of entropy

Week 10	heat engines and heat pumps
Week 11	volumetric properties of pure fluid, law of corresponding states, generalized correlation of gases, cubic equations
Week 12	generalized virial correlations, generalized correlation of liquids, PVT relations of liquid
Week 13	Clapeyron equation, Clausius-Clapeyron equation, Antoine equation, ΔH^V at normal boiling point
Week 14	relations for isothermal compressibility and volume expansivity, throttling process examples
Week 15	Maxwell Relations, partial derivative, derivations for enthalpy and entropy exercises
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	J. M. Smith and H.C. Van Ness "Introduction to Chemical Engineering Thermodynamics" 4 th Edition (1987), McGraw-Hill	Yes
Recommended Texts	M.M, Abbott and H.G. Van Ness " Thermodynamics with Chemical Application" Schaum's Outline Series McGraw-Hill second Edition (1989).	No
Websites	http://puccini.che.pitt.edu/~karlj/Classes/CHE1007	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Thermodynamics II</u>			Module Delivery
Module Type	<u>Core</u>			<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<u>ENCHThII3 30 12</u>			
ECTS Credits	<u>5.00</u>			
SWL (hr/sem)	<u>125</u>			
Module Level	UGIII	Semester of Delivery	6	
Administering Department	ENCH	College	ENG	
Module Leader	Alaa N. Ghanim		e-mail	Eng.alaaghanim@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	M. Sc.	
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	01/06/2026	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none">1. To develop solving skills and understanding problems of real gases and the thermodynamic properties (i. g., the enthalpy and entropy change) using residual property concept.2. To understand the types and the mechanism of steam power plants included Carnot cycle, Rankine cycle, Actual cycles.3. To understand the types and the mechanism of refrigeration cycles that included Carnot refrigerator, vapor compression cycle, and absorption refrigeration.4. To explain the solution thermodynamic included, ideal gas mixture, ideal solution, application of Raoult's law and vapor-liquid equilibrium, bubble point and dew point calculations.5. To know VLE from K-value, and VLE for flash calculation, azeotrope state.6. To explain the concept of partial molar property and the standard states according to Lewis-Randall and Henry's law.7. To understand the principle of fugacity and fugacity coefficient, fugacities in solution, property change of mixing solution thermodynamics.8. To declare the basis of excess property, adiabatic mixing.9. To describe the activity coefficients from VLE data.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1. Understand how to estimate the enthalpy and the entropy changes of real gas.2. Explain how to estimate the efficiency of steam power plants and their improvement.3. Describe how to estimate the coefficient of performance and energy balances of refrigeration cycles with their applications.4. Discuss solution thermodynamics and its applications with Raoult's law, Henry's law, vapor-liquid equilibrium, and bubble point and dew point calculations.

	<ol style="list-style-type: none"> 5. Summarize the vapor-liquid equilibrium from K-value in conjugate with flash calculations, and azeotrope state. 6. Understand the thermodynamics concepts of excess property, property change of mixing, adiabatic mixing. 7. Identify and correlate the activity coefficients from VLE data.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A - Thermodynamics Theory</u></p> <p>Residual property, Carnot heat engine cycle, Rankine cycle, Actual cycle, Unsteady state flow processes, Conservation of mass, Conservation of energy, Carnot refrigerator, vapor compression cycle, absorption refrigeration. [10 hrs]</p> <p>Fundamental property relations, Gibbsian equation, Chemical potential and phase equilibria, Idea gas mixture, Ideal solution, Raoult's law, Vapor-liquid equilibrium, bubble point calculation, Dew point calculation, Henry's law, VLE from K-value correlation, Partial properties, Partial properties in binary solution, The Gibbs-Duhem equation. [10 hrs]</p> <p>Fugacity and fugacity coefficient, Fugacity of gases from PVT data, Generalized correlations method, Second Virial Coefficient Method, Fugacity of gases from residual property, Vapor/liquid equilibrium for pure species, Fugacity of pure liquid, Fugacity of mixture, Property change of mixing, Heat effect of mixing process, Activity coefficients from VLE data,. [10 hrs]</p> <p><u>Part B – Thermodynamics Tutorial (Exercises)</u></p> <p>Residual Property, Steam Power Cycles, Unsteady State Flow Processes, Refrigeration Cycles. [5 hrs]</p> <p>Systems of Variable Composition, Flash calculations, Partial Molar Property .[5 hrs]</p> <p>Fugacity and Fugacity Coefficient, Property Change of Mixing, Activity Coefficients. [5 hrs]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>This will be achieved through classes, interactive tutorials and by considering type of examples involving some sampling activities that are interesting to the students.</p> <ol style="list-style-type: none"> 1. Acquire skill in the concept of residual property to estimate enthalpy change and entropy change or final temperature of chemical conversion reactions. 2. Acquire skill in the applications and comparison of steam power plants included Carnot cycle, Rankine cycle, actual cycles. 3. Acquire skill in refrigeration cycles that included Carnot refrigerator, vapor compression
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- cycle, and absorption refrigeration.
4. Acquire skills in solution thermodynamic with the states of, ideal gas mixture, ideal solution, application of Raoult's law and vapor-liquid equilibrium, bubble point and dew point calculations. An ability to develop VLE from K-value, and flash calculations.
 5. Explaining the concept of partial molar property and the standard state according to Lewis-Randall and Henry's law.
 6. Acquire skills in concepts such as of excess property, property change of mixing, adiabatic mixing.
 7. Acquire skills in correlating of activity coefficients from VLE data.

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 using the following methods.

- 1- Using lectures and presentation through LCD with aid of theoretical and practical examples.
- 2- Conducting intellectual discussions and making participations for students.
- 3- Team groups to solve thermodynamics exercises.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 4, 6, 8,10	LO # 3, 4, 6 and 7
	Labratory	1	10% (10)		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, residual property, examples
Week 2	Steam power plant, heat engine, Carnot heat engine, Rankine cycle, Actual cycle
Week 3	Unsteady state flow processes, conservation of mass, conservation of energy
Week 4	Refrigeration, Carnot refrigerator, vapor compression cycle, absorption refrigeration
Week 5	Fundamental property relations, Gibbsian equation, chemical potential and phase equilibria, ideal gas mixture, ideal solution, Raoult's law
Week 6	Vapor-liquid equilibrium, bubble point calculation, dew point calculation, Henry's law
Week 7	Vapor/liquid equilibrium (VLE) from K-value correlation
Week 8	Partial properties, partial properties in binary solution, Gibbs-Duhem equation
Week 9	Fugacity of gases from residual property, Fugacity and fugacity coefficient, fugacity of gases from PVT data
Week 10	Generalized correlations method, second Virial coefficient method
Week 11	Criterion of vapor/liquid equilibrium for pure species, fugacity of pure liquid
Week 12	Fugacity of mixture, general equation for real solution, Lewis-Randall rule, Henry's law
Week 13	Property change of mixing, ideal solution, real solution, excess property
Week 14	Heat effect of mixing process
Week 15	Activity coefficients from VLE data
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	J. M. Smith and H.C. Van Ness "Introduction to Chemical Engineering Thermodynamics" 4 th Edition (1987), McGraw-Hill	Yes
Recommended Texts	M.M, Abbott and H.G. Van Ness " Thermodynamics with Chemical Application" Schaum's Outline Series McGraw-Hill second Edition (1989).	No
Websites	http://puccini.che.pitt.edu/~karlj/Classes/CHE1007	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Reactor design</u>		Module Delivery	
Module Type	<u>Core</u>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<u>CHE3121</u>			
ECTS Credits	<u>6</u>			
SWL (hr/sem)	<u>150</u>			
Module Level	UGIII	Semester of Delivery		
Administering Department	Chemical Engineering		College	College of Engineering
Module Leader	Muataz M. Sulaiman		e-mail	eng.moataz.alchalabi@uobabylo.edu.iq
Module Leader's Acad. Title	Asst. Professor		Module Leader's Qualification	Ph.D.
Module Tutor	Tahseen A. AlHattab		e-mail	eng.moataz.alchalabi@uobabylo.edu.iq
Peer Reviewer Name	n.a.		e-mail	n.a.
Scientific Committee Approval Date	/06/2023		Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<p>47. Objectives of the study subject 48. The course aims to educate and prepare the student by laying a correct and solid foundation in knowing the most important basic rules for reactor design 49. Chemical engineering, learning about design equations and their application in their fields, how to benefit from them in various aspects, and studying topics 50. Related to the most important applications, such as batch reactor CSTR, PFR and energy balance calculations.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>1. The student is prepared to receive a solid scientific subject 2. The student learns how to benefit from the basic theoretical topics in chemical engineering And harnessed in material reactor design. 3. - The student learns how to apply the scientific materials that have been taken 5- Consolidating the scientific material correctly by conducting daily exams 6- Activating the student's role in understanding and benefiting from this material to the maximum extent</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following. Introduction to Reactor Design Symbols and Relationship between CA and X, • Ideal Reactors for a SingleReaction [3hrs] • IDEAL BATCH REACTOR [3hrs] Space-Time and Space-Velocity [3hrs] • STEADY-STATE MIXED FLOW REACTOR [3hrs] Holding time and space time for flow reactors[3hrs] Designfor Single Reactions • Multiple-reactor systems [4hrs] Equal-size mixed flow reactors in series[4hrs] • Equal-size mixed flow reactors in series[4hrs] • Mixed Flow Reactors of Different Sizes in Series [4hrs] Reactors of Different Types in Series • Recycle reactor [5hrs] • Autocatalytic reactions [5hrs] • Reactor combinations [5hrs] Review and Examination Preparation [12 hrs]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> 1. The student is prepared to receive a solid scientific subject 2. The student learns how to benefit from the basic theoretical topics in chemical engineering And harnessed in material reactor design. 3. - The student learns how to apply the scientific materials that have been taken 5- Consolidating the scientific material correctly by conducting daily exams 6- Activating the student's role in understanding and benefiting from this material to the maximum extent <p>Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 5,8,11	LO # 3, 4, 6 and 7
	Report			13	LO # 5, 8 and 10

Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Reactor Design Symbols and Relationship between CA and X,
Week 2	Tutorial
Week 3	Ideal Reactors for a Single Reaction, IDEAL BATCH REACTOR, Space-Time and Space-Velocity STEADY-STATE MIXED FLOW REACTOR
Week 4	Steady-state plug flow reactor, Holding time and space time for flow reactors
Week 5	Tutorial
Week 6	Exame
Week 7	Design for Single Reactions, SIZE COMPARISON OF SINGLE.
Week 8	Multiple-reactor systems, Equal-size mixed flow reactors in series
Week 9	Mixed Flow Reactors of Different Sizes in Series
Week 10	Reactors of Different Types in Series
Week 11	Recycle reactor
Week 12	Autocatalytic reactions
Week 13	Reactor combinations
Week 14	Tutorial
Week 15	Exame

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 4	
Week 7	

Week 10	
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Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	J. P. Holman, Chemical Reaction Engineering, 3rd , Octave Levenspiel, NY,1999	Yes
Recommended Texts		
Websites		

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

Module Information		
معلومات المادة الدراسية		
Module Title	<u>Kinetic Reaction</u>	Module Delivery

Module Type	Core	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	chE3111		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	5
Administering Department	Chemical Engineering	College	College of Engineering
Module Leader	dr. muataz mohammed sulaiman	e-mail	Alhattab.t@UoBablon.edu.iq
Module Leader's Acad. Title	Asst. Professor	Module Leader's Qualification	Ph.D.
Module Tutor	dr. Muataz M.Sulaiman	e-mail	Alhattab.t@UoBablon.edu.iq
Peer Reviewer Name	n.a.	e-mail	n.a.
Scientific Committee Approval Date	/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	51. Objectives of the study subject 52. The course aims to educate and prepare the student by laying a correct and solid foundation in knowing the most important basic rules for reactor design 53. Chemical engineering, learning about design equations and their application in their fields, how to benefit from them in various aspects, and studying topics 54. Related to the most important applications, such as batch reactor CSTR, PFR and energy
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	balance calculations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. The student is prepared to receive a solid scientific subject 2. The student learns how to benefit from the basic theoretical topics in chemical engineering And harnessed in material reactor design. 3. - The student learns how to apply the scientific materials that have been taken 5- Consolidating the scientific material correctly by conducting daily exams 6- Activating the student's role in understanding and benefiting from this materia the maximum extent
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Overview of Chemical Reaction Engineering - Definition of Reaction Rate [3hrs] • Speed of Chemical Reactions [3hrs] Kinetics of Homogeneous Reactions • The rate equation [4hrs] • Elementary and nonelementary reactions Rate constant k [4hrs] • Temperature-dependent term of a rate equation [4hrs] • Temperature dependency from arrhenius' law Activation energy and temperature dependency [4hrs] Interpretation of Batch Reactor Data • CONSTANT-VOLUME BATCH REACTOR Integral Method of Analysis of Data [5hrs] • Homogeneous catalyzed reactions Autocatalytic reactions [5hrs] • Reactions of Shifting Order [5hrs] • Differential Method of Analysis of Data [5hrs] Review and Examination Preparation [12 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	<p>Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of Kinetics reaction. The lectures will provide a theoretical foundation and present key concepts and equations.</p> <p>Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve Kinetics reaction problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of Kinetics reaction concepts.</p> <p>Laboratory Sessions: Practical laboratory sessions will be conducted to allow students to observe and measure Kinetics reaction phenomena. They will have hands-on experience with Kinetics reaction experiments, data collection, and analysis. These sessions will help students</p>

develop practical skills and relate theory to real-world applications.

Group Projects: Collaborative group projects can be assigned to promote teamwork and critical thinking. Students can work together to analyze and design Kinetics reaction systems for specific applications. This activity encourages problem-solving skills, effective communication, and the ability to apply Kinetics reaction principles in practical situations.

Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of Chemical Reaction Engineering
Week 2	Definition of Reaction Rate Speed of Chemical Reactions
Week 3	Tutorial
Week 4	The rate equation, Elementary and nonelementary reactions Rate constant k.
Week 5	Temperature-dependent term of a rate equation, Temperature dependency from arrhenius' law, Activation energy and temperature dependency
Week 6	Tutorial
Week 7	Exame
Week 8	Interpretation of Batch Reactor Data, CONSTANT-VOLUME BATCH REACTOR Integral Method of Analysis of Data
Week 9	Homogeneous catalyzed reactions, Autocatalytic reactions
Week 10	Reactions of Shifting Order.
Week 11	Differential Method of Analysis of Data
Week 12	Varying-volume batch reactor, Differential method of analysis, Integral method of analysis
Week 13	Temperature and reaction rate
Week 14	Tutorial
Week 15	Exame

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Effect of Reactant Concentration on Reaction Rate
Week 4	Lab 2: Effect of Temperature on Reaction Rate and Activation Energy
Week 7	Lab 3: Determination of Reaction Order by the Initial Rates Method
Week 10	Lab 4: Investigation of Homogeneous and Heterogeneous Catalysis

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Octave Levenspiel , Chemical Reaction Engineering, 3rd ed., NY,1999	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Mass Transfer I</u>	Module Delivery
Module Type	<u>Core</u>	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<u>ENCHME3502</u>	
ECTS Credits	<u>5</u>	
SWL (hr/sem)	<u>125</u>	

Module Level	UGIII	Semester of Delivery	5
Administering Department	Chemical Engineering	College	College of Engineering
Module Leader	Sata K. Ahmed Ajjam	e-mail	eng.sata.kathum@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	M.Sc.
Module Tutor	Sata K. Ahmed Ajjam	e-mail	eng.sata.kathum@uobabylon.edu.iq
Peer Reviewer Name	n.a.	e-mail	n.a.
Scientific Committee Approval Date	/06/2026	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. The student will have the ability to define the Mass Transfer fundamentals and its application. 2- The student will be able to identify the mass transfer equipments and its type. 3_ the student can be able to recognize each type of mass transfer application and the methods of its operation. 4- To learn the student how to design the equipment of mass transfer processes and make the material and energy balance of the units. 5- To learn the student how to solve the problem and the troubleshooting of chemical industries.
Module Learning Outcomes	<p>A - Cognitive goals</p> <p>1- To learn the student how to design the equipment of mass transfer p make the material and energy balance</p>

مخرجات التعلم للمادة الدراسية

- 2- To learn the student how to solve the problem and the troubleshooting of the equipment's for chemical process.
- 3- To learn the student how to solve the mass transfer problem of process.

B- The skills goals special to the course

1. The student will be able to design the equipment of mass transfer and operation.
2. The student will identify the problems and the troubleshooting of equipment that control its operation

Indicative Contents

المحتويات الإرشادية

Indicative content includes the following.

Introduction to Mass Transfer

- Definition and importance of Mass transfer [3hrs]
- Modes of Mass transfer [3hrs]
- Basic concepts and terminology [3hrs]

Mass Transfer Concepts

- Reverse Diffusion.
 - Diffusion through stagnant layer.
- Equimolecular counter Diffusion
- Coefficient of Diffusivity.

- Mass Transfer Theory
- Mass Transfer Coefficient.

Review and Examination Preparation [12 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of mass transfer. The lectures will provide a theoretical foundation and present key concepts and equations.

Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve mass transfer problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of mass transfer concepts.

Laboratory Sessions: XXX

Group Projects: Collaborative group projects can be assigned to promote teamwork and critical thinking. Students can work together to analyze and design mass transfer systems for specific applications. This activity encourages problem-solving skills, effective communication, and the ability to apply mass transfer principles in practical situations.

Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	7.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	10% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	0	0	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	المعكس Reverse Diffusion الانتشار خلال الطبقة الساكنة Diffusion through stagnant layer.
Week 2	Equimolecular counter Diffusion
Week 3	Mass Transfer Coefficient.
Week 4	نظريات انتقال الكتلة Mass Transfer Theory.
Week 5	Distillation
Week 6	التقطير Distillation طريقة ميكب-ثيل Mc-Cabe Theile Method
Week 7	طريقة لويس-سوريل Lewis-Sorel Method
Week 8	التقطير للمزيج متعدد المكونات Multicomponent Distillation
Week 9	التقطير الدفعي Batch Distillation
Week 10	امتصاص الغاز Gas Absorption.
Week 11	ارتفاع برج الامتصاص The height of absorption tower
Week 12	أنواع أبراج الامتصاص The type of absorption tower.
Week 13	كفاءة أبراج الامتصاص The efficiency of absorption tower.
Week 14	برج الامتصاص وقطره The diameter of absorption tower
Week 15	Mass transfer and other transport phenomena.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	xxx
Week 4	xxx
Week 7	xxx
Week 10	xxx

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-Coulson & Richardson's Chemical Engineering Solutions, Volume 2	Yes
Recommended Texts	1-Coulson & Richardson's Chemical Engineering Solutions, Volume 1 & 2	Yes
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Mass Transfer II</u>		Module Delivery	
Module Type	<u>Core</u>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<u>ENCHME3601</u>			
ECTS Credits	<u>6</u>			
SWL (hr/sem)	<u>150</u>			
Module Level	UGIII	Semester of Delivery	6	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Sata K. Ahmed Ajjam		e-mail	eng.sata.kathum@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	M.Sc.	
Module Tutor	Sata K. Ahmed Ajjam		e-mail	eng.sata.kathum@uobabylon.edu.iq
Peer Reviewer Name	n.a.	e-mail	n.a.	
Scientific Committee Approval Date	/06/2026	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	46. The student will have the ability to define the Mass Transfer fundamentals and its application. 47. The student will be able to identify the mass transfer equipments and its type.
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	<p>48. the student can be able to recognize each type of mass transfer application and the methods of its operation.</p> <p>49. To learn the student how to design the equipment of mass transfer processes and make the material and energy balance of the units.</p> <p>50. To learn the student how to solve the problem and the troubleshooting of chemical industries.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>A - Cognitive goals</p> <p>1- To learn the student how to design the equipment of mass transfer processes and make the material and energy balance of the units.</p> <p>2- To learn the student how to solve the problem and the troubleshooting of chemical equipment's for industries.</p> <p>3- To learn the student how to solve the mass transfer problem and the troubleshooting of chemical industries.</p> <hr/> <p>B- The skills goals special to the course</p> <p>1. The student will be able to desing the equipment of mass transfer processes and make the material and energy balance of the units.</p> <p>2. The student will identify the problems and the troubleshooting that control its operation</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Liquid Extraction</p> <p>Drying and Humifactions</p> <p>Evaporation</p> <p>Adsorption and Ion Exchange</p> <p>Review and Examination Preparation [13hrs]</p>

<p>Learning and Teaching Strategies</p> <p>استراتيجيات التعلم والتعليم</p>	
<p>Strategies</p>	<p>Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of mass transfer. The lectures will provide a theoretical foundation and present key concepts and equations.</p> <p>Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve mass transfer problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of mass transfer concepts.</p> <p>Laboratory Sessions: Practical laboratory sessions will be conducted to allow students to observe and measure mass transfer phenomena. They will have hands-on experience with mass transfer experiments, data collection, and analysis. These sessions will help students develop</p>

practical skills and relate theory to real-world applications.

Group Projects: Collaborative group projects can be assigned to promote teamwork and critical thinking. Students can work together to analyze and design mass transfer systems for specific applications. This activity encourages problem-solving skills, effective communication, and the ability to apply mass transfer principles in practical situations.

Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	الاستخلاص (سائل-سائل) Extraction
Week 2	حسابات الأستخلاص لحالة الذوبان الجزئي Extraction Calculation for partial miscible solvents
Week 3	حسابات الأستخلاص للسوائل الغير ذائبة Extraction Calculation for immiscible solvents
Week 4	الأستخلاص الدفعي Batch Extraction
Week 5	الأستخلاص المستمر للجريان المتوازي والمتعاكس Extraction Calculation for partial miscible solvents co-current
Week 6	الأستخلاص المستمر للجريان المتوازي والمتعاكس Extraction Calculation for partial miscible solvents counter-current
Week 7	الترطيب وابراج التبريد والتجفيف Humidification and Cooling Tower
Week 8	مراحل التجفيف Drying
Week 9	حسابات زمن التجفيف للمرحلتين الثابتة والتغيرة Drying calculation for time periods
Week 10	أنواع المبخرات Evaporation Types of Evaporators
Week 11	المبخرات الأحادية والمتعددة Single and Multi effect evaporator
Week 12	Adsorption, Principles of Adsorption, Capacity of Columns
Week 13	Gas Drying Equipment, Adsorption Equipment,
Week 14	Types of Isotherms , adsorption kinetics isotherms
Week 15	Problem and exercises on adsorption kinetics isotherms

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: التجربة الأولى: الانتشار الجزيئي في السوائل (Diffusion in Liquids)

Week 4	Lab 2: التجربة الثانية: انتقال الكتلة بين غاز وسائل (Gas–Liquid Mass Transfer)
Week 7	Lab 3: التجربة الثالثة: الامتصاص (Absorption of Gas in Liquid)
Week 10	Lab 4: التجربة الرابعة: الاستخلاص السائل-السائل (Liquid–Liquid Extraction)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-Coulson & Richardson's Chemical Engineering Solutions, Volume 2	Yes
Recommended Texts	1-Coulson & Richardson's Chemical Engineering Solutions, Volume 1 & 2	Yes
Websites	https://sites.google.com/uobabylon.edu.iq/heat-transfer-virtual-lab/home	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Corrosion</u>		Module Delivery	
Module Type	<u>Core</u>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<u>ENCHHtII3 26 08</u>			
ECTS Credits	<u>6</u>			
SWL (hr/sem)	<u>150</u>			
Module Level	UGIII	Semester of Delivery	6	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Kadhim F Alsultani	e-mail	finteelalsultani@UoBablon.edu.iq	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Kadhim F Alsultani	e-mail	finteelalsultani@UoBablon.edu.iq	
Peer Reviewer Name	n.a.	e-mail	n.a.	
Scientific Committee Approval Date	/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Objectives of the study subject
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	The course aims to educate and prepare the student by laying a correct and solid foundation in knowing the most important basic rules for corrosion for Chemical engineering, learning about chemicals equations and their application in their fields, how to benefit from them in various aspects, and studying topics
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	55. 1. The student is prepared to receive a solid scientific subject 56. 57. 2. The student learns how to benefit from the basic theoretical topics in chemicalengineering 58. And harnessed in material reaction kinetics corrosion . 59. 3. - The student learns how to apply the scientific materials that have been taken 60. 5- Consolidating the scientific material correctly by conducting daily exams 61. 6- Activating the student's role in understanding and benefiting from this material to the maximum extent
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Type of corrosion Mechanism of corrosion Inhibitor of corrosion Corrosion rate and calculation Cathodic protection and calculation

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. The student is prepared to receive a solid scientific subject 2. The student learns how to benefit from the basic theoretical topics in chemical engineering And harnessed in material reactor design. 3. - The student learns how to apply the scientific materials that have been taken 5- Consolidating the scientific material correctly by conducting daily exams 6- Activating the student's role in understanding and benefiting from this material to the maximum extent
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Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Factors That Influence Reaction corrosion Rate
Week 3	Expressing the Reaction corrosionRat
Week 4	Types of corrosion
Week 5	Factors effect on corrosion
Week 6	Uniform corrosion and Galvanic corrosion
Week 7	Intergranular corrosion and Pitting corrosion
Week 8	Cathodic production

Week 9	polarization
Week 10	potentiostat
Week 11	becks diagram
Week 12	Michanisims of corrosion
Week 13	Linear polarization
Week 14	Green inhibitor
Week 15	Final Examination

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: estimate of corrosion rate by weight loss
Week 4	Lab 2: estimate of corrosion rate by temperature effect
Week 7	Lab 3 estimate of corrosion rate by velocity effect
Week 10	Lab 4: estimate of corrosion rate by inhibitor effect

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	J. P. Holman, Heat Transfer, 10th ed., McGraw Hill, NY,2010	Yes
Recommended Texts	Incropera, F. P., DeWitt, D. P., Bergman, T. L., & Lavine, A. S. (2013). Fundamentals of heat and mass transfer. Wiley.	No
Websites	https://sites.google.com/uobabylon.edu.iq/heat-transfer-virtual-lab/home	

Grading Scheme

مخطط الدرجات

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

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

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

Module Information

معلومات المادة الدراسية

Module Title	English Language		Module Delivery	
Module Type	Basic		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code				
ECTS Credits	8			
SWL (hr/sem)	200			
Module Level		Semester of Delivery		
Administering Department	Chemical Engineering	College	Engineering	
Module Leader	Nisreen Jasim Hussein		e-mail	eng.nasren.jasimab@uobabylon.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification		MSc.
Module Tutor	None		e-mail	None
Peer Reviewer Name	None		e-mail	None
Scientific Committee Approval Date	6/06/2026	Version Number		1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ul style="list-style-type: none"> Developing students' English language skills focusing on grammar, vocabulary, reading, and listening. Enhancing technical and general vocabulary, particularly focusing on word formation, spelling, and pronunciation. Improving communicative competence through everyday English and social expressions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ul style="list-style-type: none"> Identify and accurately use various English tenses and auxiliary verbs. Apply correct word formation techniques, spelling, and phonetic pronunciation based on New Headway syllabus. Demonstrate comprehension of academic and general reading texts. Use short answers and social expressions appropriately in conversation.
Indicative Contents المحتويات الإرشادية	Indicative content focuses on New Headway Intermediate (<ul style="list-style-type: none"> Grammar: Auxiliary verbs (do, be, have), Naming tenses (Present, Past, Present Perfect), Questions and negatives. Vocabulary: Parts of speech and meaning, Spelling and pronunciation, Word formation, Collocations (Words that go together), Keeping vocabulary records. Everyday English: Social expressions, Short answers in conversation. Reading & Listening: "Wonders of the modern world", "My wonders".

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1) White board.
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- 2) Hand out lecture notes.
- 3) Hand out some kinds of pictures related to specific topics.
- 4) Lectures and interactive classroom discussions.
- 5) Reading comprehension exercises using textbook materials.
- 6) Listening practice using audio tracks from the Headway course.
- 7) Vocabulary building activities

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (15)	5, 8	LO # 2, 3,4 and 6, 7
	Assignments	2	10% (10)	6, 12	LO # 3, 4, 5 and 9, 10 and 11
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	Continuous
Summative assessment	Midterm Exam	2 hr	10% (10)	10	LO # 1-9
	Final Exam	3hr	50% (50)	16 or 17	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Material Covered

Week 1	Introduction to the course. Unit 1: "It's a wonderful world!" - General knowledge quiz and Tenses overview.
Week 2	Grammar Focus: Auxiliary verbs (do, be, have) and recognizing tenses in context.
Week 3	Grammar Practice: Forming questions and negatives (e.g., What did you do last night?).
Week 4	Making Conversation: The use of short answers in English to sound polite and natural.
Week 5	Vocabulary (What's in a word?): Understanding parts of speech and deriving meaning from context.
Week 6	Vocabulary: Spelling patterns, pronunciation rules, and introduction to phonetic symbols.
Week 7	Vocabulary: Word formation using suffixes and prefixes, and learning collocations (words that go together).
Week 8	Mid-Term Examination
Week 9	Study Skills: Methods for keeping vocabulary records and effective dictionary usage.
Week 10	Reading Comprehension: "Wonders of the modern world" - Analyzing technological and scientific achievements (Part 1).
Week 11	Reading Comprehension: "Wonders of the modern world" - Vocabulary extraction and text discussion (Part 2).
Week 12	Listening and Speaking: "My wonders" - Listening for specific information and expressing opinions.
Week 13	Everyday English: Common social expressions and idiomatic phrases used in daily interactions.
Week 14	Writing Skills: Correcting mistakes - Finding and correcting language mistakes in an informal letter.
Week 15	Comprehensive review of Unit 1 vocabulary, grammar, and reading concepts.
Week 16	Preparatory week before the Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	None
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	Mid-term Exam
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	

Week 14		
Week 15		
Week 16		
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	
	Available in the Library?	
Required Texts	<p>Reading comprehension exercises using textbook materials.</p> <p>Listening practice using audio tracks from the Headway course.</p> <p>Vocabulary building activities</p>	No
Recommended Texts		No
Websites		

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Engineering Analysis</u>		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<u>ENCHHTII3 26 08</u>			
ECTS Credits	6			
SWL (hr/sem)	<u>150</u>			
Module Level	UGIII	Semester of Delivery	6	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Ali Safa Nouri Alsaegh		e-mail	Alsaeghali@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	Ph.D.
Module Tutor	Ali Safa Nouri Alsaegh		e-mail	Alsaeghali@uobabylon.edu.iq
Peer Reviewer Name	n.a.		e-mail	n.a.
Scientific Committee Approval Date	07/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The aim of this subject is to make the students ready to understand and comprehend the scientific theories and their applications related to their field of the study.
Module Learning	

Outcomes مخرجات التعلم للمادة الدراسية	62. Teaching and Learning Strategies The objective of the course is to give third year chemical engineering students the fundamental of Engineering analysis. 63. Demonstrate a solid understanding of the fundamental principles and engineering analysis. 64. Apply mathematical models and equations to analyze different engineering problems. 65. Employ critical thinking skills to identify and solve complex engineering problems. 66. Communicate effectively, both orally and in writing, about advanced engineering mathematics' concepts and solutions.
Indicative Contents المحتويات الإرشادية	The engineering analysis course includes six chapters, respectively: (1) Applications of differential equations of degree 1 and 2 (2) Instant differential equations. (3) differential equations of with high order. (4) Fourier transform. (5) Laplace's equation. (6) mathematical model (7) Partial Differential Equation (PDE)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of engineering nanalysis. The lectures will provide a theoretical foundation and present key concepts and equations.</p> <p>Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve different problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of advanced engineerignalysis.</p> <p>Group Projects: Collaborative group projects can be assigned to promote teamwork and critical thinking.</p> <p>Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	10% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Class work		10%	Continuous	
	Report		10%	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (30)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of first order differential Equations
Week 2	Applications of Ordinary differential equation (ODE)
Week 3	Example and application of ODE
Week 4	Example and application of ODE
Week 5	Mid exam 1
Week 6	solution by Series
Week 7	Example of Series Solve the ODE by Series
Week 8	Laplace transformation
Week 9	inverse Laplace transformationsolution of differential equation using Laplace transformation

Week 10	Mid exam 2
Week 11	partial differential equations (PDE) Mathematical modeling (Heat transfer.
Week 12	mathematical modeling, Mass transfer, reactor)
Week 13	Reviewing
Week 14	Final exams
Week 15	Final exams

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week No.	-
Week No.	-
Week No.	-
Week No.	-

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Wicaksana and T. Rachman, HIGHER ENGINEERING, vol. 3, no. 1. 2018	Yes
Recommended Texts	Wicaksana and T. Rachman, HIGHER ENGINEERING, vol. 3, no. 1. 2018.	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Engineering Economics</u>		Module Delivery	
Module Type	<u>Support</u>		5. <input checked="" type="checkbox"/> Theory • <input type="checkbox"/> Lecture • <input type="checkbox"/> Lab • <input checked="" type="checkbox"/> Tutorial • <input type="checkbox"/> Practical • <input type="checkbox"/> Seminar	
Module Code	<u>CHME3603</u>			
ECTS Credits	<u>3</u>			
SWL (hr/sem)	<u>75</u>			
Module Level	UGIII	Semester of Delivery	3	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Ameer Abdulkareem Hadi	e-mail	Eng245.ameer.abdulkareem@uobabylon.edu.iq	
Module Leader's Acad. Title	Assist. Lect.	Module Leader's Qualification	MSc	
Module Tutor	None	e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none">1- Understand the fundamental concepts: The course aims to provide students with a solid understanding of the fundamental concepts and principles of engineering economics. This includes topics such as time value of money, cash flow analysis, interest rates, inflation, and depreciation.2- Apply economic analysis techniques: The course aims to enable students to apply economic analysis techniques to evaluate engineering projects and make informed decisions.3- Evaluate project feasibility: The course aims to equip students with the skills to assess the feasibility of engineering projects from an economic standpoint. Students learn to analyze project costs, revenues, and profitability to determine the viability and potential risks associated with different projects.4- Consider economic factors in decision-making: The course aims to help students understand the importance of economic factors in decision-making processes. They learn to incorporate economic considerations alongside technical, environmental, and social factors when evaluating alternative options and selecting the most economically viable solutions.5- Perform life cycle cost analysis: The course aims to familiarize students with life cycle cost analysis, which involves assessing the total cost of a project or a product throughout its entire life cycle. Students learn to consider factors such as initial investment, operating costs, maintenance expenses, and disposal costs to make economically sound decisions.6- Understand economic optimization: The course aims to introduce students to the concept of economic optimization, where they learn to maximize economic benefits or minimize costs while considering relevant constraints. Students are exposed to mathematical modeling techniques and optimization tools to help them analyze and optimize engineering systems.7- Develop economic decision-making skills: The course aims to develop students' critical thinking and problem-solving skills by applying economic principles to real-world engineering scenarios. Through case studies and practical examples, students
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	enhance their ability to make informed economic decisions, considering uncertainties and risk analysis.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Demonstrate knowledge: Students should be able to demonstrate a solid understanding of the fundamental concepts and principles of engineering economics, including time value of money, cash flow analysis, interest rates, and depreciation. 2. Apply economic analysis techniques: Students should be able to apply economic analysis techniques, such as net present value (NPV), internal rate of return (IRR), benefit-cost ratio (BCR), and payback period, to evaluate and compare the financial viability of engineering projects. 3. Evaluate project feasibility: Students should be able to assess the feasibility of engineering projects by analyzing project costs, revenues, and profitability. They should be able to identify and evaluate potential risks and uncertainties associated with different projects. 4. Consider economic factors in decision-making: Students should be able to consider economic factors alongside technical, environmental, and social factors when making engineering decisions. They should be able to weigh the economic implications of different options and select the most economically viable solutions. 5. Perform life cycle cost analysis: Students should be able to perform life cycle cost analysis by considering the total cost of a project or a product over its entire life cycle. They should be able to assess and compare the costs associated with initial investment, operation, maintenance, and disposal. 6. Optimize engineering systems: Students should be able to apply economic optimization techniques to maximize economic benefits or minimize costs within given constraints. They should be able to develop mathematical models and use optimization tools to analyze and optimize engineering systems. 7. Apply decision-making skills: Students should be able to apply critical thinking and problem-solving skills to real-world engineering scenarios. They should be able to make informed economic decisions by considering uncertainties, conducting risk analysis, and incorporating economic considerations into the decision-making process.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<ol style="list-style-type: none"> 1. Introduction to Engineering Economics: <ol style="list-style-type: none"> a. Importance of engineering economics in decision-making b. Time value of money and its applications c. Interest rates, inflation, and their impact on economic analysis 2. Cash Flow Analysis: <ol style="list-style-type: none"> d. Cash flow diagrams and terminology e. Cash flow estimation methods f. Techniques for analyzing cash flows (e.g., present worth analysis, future worth analysis) 3. Evaluation of Engineering Projects: <ol style="list-style-type: none"> g. Net present value (NPV) analysis h. Internal rate of return (IRR) analysis i. Benefit-cost ratio (BCR) analysis j. Payback period analysis 4. Project Feasibility and Risk Analysis: <ol style="list-style-type: none"> k. Assessing project costs and revenues l. Sensitivity analysis and scenario analysis m. Incorporating uncertainty and risk in economic analysis 5. Depreciation and Taxes: <ul style="list-style-type: none"> • Types of depreciation methods (e.g., straight-line, declining balance) • Tax considerations and their impact on project evaluation 6. Life Cycle Cost Analysis:

- Total cost concept and life cycle assessment
- Initial investment costs
- Operating costs, including energy consumption and raw materials
- Maintenance costs
- Disposal costs and environmental impacts

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

The learning and teaching strategies for an Engineering Economic course for Chemical Engineering can vary depending on the educational institution and instructor's preferences. However, here are some common strategies that are often employed in such a course:

1. Lectures: Traditional lectures are commonly used to present and explain key concepts, theories, and principles of engineering economics. The instructor may use visual aids such as slides, charts, and graphs to enhance understanding.
2. Problem-solving sessions: Problem-solving sessions are valuable for students to apply the concepts learned in lectures. The instructor can provide practice problems and guide students through the process of solving them, emphasizing the application of economic analysis techniques to engineering scenarios.
3. Research projects: Assigning research projects related to engineering economics allows students to explore specific topics of interest or emerging trends in the field.
4. Assessments and feedback: Regular assessments, such as quizzes, exams, and

assignments, enable students to demonstrate their understanding of the course material.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	65	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	10	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (10)	2 , 4, 12	LO #1, 2, 3,9 and 11
	Assignments	2	10% (10)	3 , 5	LO # 1,2, 3, 4, 6 and 9 and 11
	Projects / Lab.	0	0% (0)	0	
	Report	1	10% (10)	12	
Summative assessment	Midterm Exam	2 hr	15% (15)	7 and 10	LO # 1-7 and 7-15
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Engineering Economics
Week 2	Time Value of Money: Present Worth Analysis
Week 3	Time Value of Money: Future Worth Analysis
Week 4	Cash Flow Diagrams and Terminology Cash Flow Estimation Methods
Week 5	Equivalent Annual Worth Analysis
Week 6	Mid exam
Week 7	Interest Rates and Inflation
Week 8	Project Evaluation: Net Present Value (NPV) Analysis
Week 9	Interest Rates and Inflation
Week 10	Project Evaluation: Net Present Value (NPV) Analysis
Week 11	Project Evaluation: Payback Period Analysis Depreciation and Taxes
Week 12	Sensitivity Analysis and Scenario Analysis Incorporating Uncertainty and Risk in Economic Analysis
Week 13	Quiz and assignment discussion
Week 14	Life Cycle Cost Analysis: Concepts and Applications

Week 15	Life Cycle Cost Analysis: Case Studies
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	PLANT DESIGN AND ECONOMICS FOR CHEMICAL ENGINEERS, Fourth Edition, Max S. Peters	Yes
Recommended Texts	Any Books they could get	No
Websites	N/A	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Heat Transfer I</u>		Module Delivery	
Module Type	<u>Core</u>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<u>ENCHHtI3 21 03</u>			
ECTS Credits	<u>6</u>			
SWL (hr/sem)	<u>150</u>			
Module Level	UGIII	Semester of Delivery	5	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Tahseen A. AlHattab	e-mail	Alhattab.t@UoBablon.edu.iq	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Tahseen A. AlHattab	e-mail	Alhattab.t@UoBablon.edu.iq	
Peer Reviewer Name	n.a.	e-mail	n.a.	
Scientific Committee Approval Date	/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
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Co-requisites module	None	Semester	
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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<p>51. To introduce the fundamental principles and theories of heat transfer.</p> <p>52. To develop an understanding of the different modes of heat transfer and their applications.</p> <p>53. To provide students with the necessary tools and techniques to analyze heat transfer problems in engineering systems.</p> <p>54. To enhance problem-solving and analytical skills related to heat transfer.</p> <p>55. To encourage critical thinking and the ability to apply heat transfer concepts to real-world engineering problems.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>67. Demonstrate a solid understanding of the fundamental principles and theories of heat transfer.</p> <p>68. Differentiate between different modes of heat transfer and explain their applications in engineering systems.</p> <p>69. Apply mathematical models and equations to analyze heat transfer problems.</p> <p>70. Design and evaluate heat transfer systems for various engineering applications.</p> <p>71. Employ critical thinking skills to identify and solve complex heat transfer problems.</p> <p>72. Communicate effectively, both orally and in writing, about heat transfer concepts and solutions</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Introduction to Heat Transfer</p> <ul style="list-style-type: none"> • Definition and importance of heat transfer [3hrs] • Modes of heat transfer [3hrs] • Basic concepts and terminology [3hrs] <p>Conduction Heat Transfer</p> <ul style="list-style-type: none"> • Fourier's law of heat conduction [4hrs] • Steady-state and transient conduction [4hrs] • One-dimensional and multi-dimensional conduction [4hrs] • Thermal resistance concept [4hrs] <p>Convection Heat Transfer</p> <ul style="list-style-type: none"> • Convection mechanisms: forced convection [5hrs] • Boundary layer concepts [5hrs] • Convective heat transfer coefficients [5hrs] • External and internal flow heat transfer [5hrs]

	Review and Examination Preparation [12 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of heat transfer. The lectures will provide a theoretical foundation and present key concepts and equations.</p> <p>Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve heat transfer problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of heat transfer concepts.</p> <p>Laboratory Sessions: Practical laboratory sessions will be conducted to allow students to observe and measure heat transfer phenomena. They will have hands-on experience with heat transfer experiments, data collection, and analysis. These sessions will help students develop practical skills and relate theory to real-world applications.</p> <p>Group Projects: Collaborative group projects can be assigned to promote teamwork and critical thinking. Students can work together to analyze and design heat transfer systems for specific applications. This activity encourages problem-solving skills, effective communication, and the ability to apply heat transfer principles in practical situations.</p> <p>Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Concepts and Mechanism of heat flow, Modes of heat transfer, their physical mechanism,
Week 2	Laws of heat transfer, thermal conductivity, heat transfer coefficient, radiation heat transfer coefficient.
Week 3	Steady state heat conduction without heat generation in plane and composite wall, hollow cylinder.
Week 4	Boundary conditions. Steady state heat conduction with heat generation in plane wall, cylinder and sphere.
Week 5	Extended Surface: Types of fins, governing equation,
Week 6	Fin performance, fin efficiency, fin effectiveness, overall fin effectiveness, and approximate solution of fins.
Week 7	Thermal contact resistance, critical thickness of insulation on cylindrical bodies.
Week 8	Steady state Two and Multi-dimensional heat conduction.
Week 9	Unsteady state heat conduction: lumped system
Week 10	Unsteady state heat conduction: Distributed Systems
Week 11	Principle of heat convection: mechanism, natural and forced convection,
Week 12	Convection boundary layers: laminar and turbulent, momentum and energy equations.
Week 13	Laminar flow over bodies, turbulent flow inside circular and non-circular ducts,
Week 14	Reynolds Colburn analogy for flow over flat plate and flow inside tube, coefficient of friction and friction factor.
Week 15	Heat transfer in fully developed flow.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Temperature Measurement
Week 4	Lab 2: Heat Capacity of Liquid
Week 7	Lab 3: Heat Capacity of Solid
Week 10	Lab 4: Thermal conductivity of Materials

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	J. P. Holman, Heat Transfer, 10th ed., McGraw Hill, NY,2010	Yes
Recommended Texts	Incropera, F. P., DeWitt, D. P., Bergman, T. L., & Lavine, A. S. (2013). Fundamentals of heat and mass transfer. Wiley.	No
Websites	https://sites.google.com/uobabylon.edu.iq/heat-transfer-virtual-lab/home	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Heat Transfer II</u>		Module Delivery	
Module Type	<u>Core</u>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<u>ENCHHtII3 26 08</u>			
ECTS Credits	<u>6</u>			
SWL (hr/sem)	<u>150</u>			
Module Level	UGIII	Semester of Delivery	6	
Administering Department	Chemical Engineering	College	College of Engineering	
Module Leader	Tahseen A. AlHattab		e-mail	Alhattab.t@UoBablon.edu.iq
Module Leader's Acad. Title	Professor		Module Leader's Qualification	Ph.D.
Module Tutor	Tahseen A. AlHattab		e-mail	Alhattab.t@UoBablon.edu.iq
Peer Reviewer Name	n.a.		e-mail	n.a.
Scientific Committee Approval Date	/06/2023		Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims	
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أهداف المادة الدراسية	<p>56. To introduce the fundamental principles and theories of heat transfer.</p> <p>57. To develop an understanding of the different modes of heat transfer and their applications.</p> <p>58. To provide students with the necessary tools and techniques to analyze heat transfer problems in engineering systems.</p> <p>59. To enhance problem-solving and analytical skills related to heat transfer.</p> <p>60. To encourage critical thinking and the ability to apply heat transfer concepts to real-world engineering problems.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>73. Demonstrate a solid understanding of the fundamental principles and theories of heat transfer.</p> <p>74. Differentiate between different modes of heat transfer and explain their applications in engineering systems.</p> <p>75. Apply mathematical models and equations to analyze heat transfer problems.</p> <p>76. Design and evaluate heat transfer systems for various engineering applications.</p> <p>77. Employ critical thinking skills to identify and solve complex heat transfer problems.</p> <p>78. Communicate effectively, both orally and in writing, about heat transfer concepts and solutions</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Convection Heat Transfer</p> <ul style="list-style-type: none"> •Convection mechanisms: natural convection [4hrs] •Boundary layer concepts [4hrs] •Convective heat transfer coefficients [4hrs] •Mixed convection [4hrs] <p>Radiation Heat Transfer</p> <ul style="list-style-type: none"> •Electromagnetic radiation and blackbody radiation [4hrs] •Radiation heat transfer principles and laws [4hrs] •Radiation exchange between surfaces [4hrs] •View factors and radiation shielding [4hrs] <p>Combined Heat Transfer</p> <ul style="list-style-type: none"> •Combined modes of heat transfer: conduction, convection, and radiation [4hrs] •Heat exchangers and their applications [4hrs] •Heat transfer in porous media [4hrs] <p>Review and Examination Preparation [13hrs]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>Lectures: The module will include lectures delivered by the instructor to introduce and explain the fundamental principles and theories of heat transfer. The lectures will provide a theoretical foundation and present key concepts and equations.</p> <p>Tutorials and Problem-Solving Sessions: These sessions will provide opportunities for students to apply their knowledge and problem-solving skills to solve heat transfer problems. Students will work on exercises and examples under the guidance of the instructor, allowing them to practice and reinforce their understanding of heat transfer concepts.</p>
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Laboratory Sessions: Practical laboratory sessions will be conducted to allow students to observe and measure heat transfer phenomena. They will have hands-on experience with heat transfer experiments, data collection, and analysis. These sessions will help students develop practical skills and relate theory to real-world applications.

Group Projects: Collaborative group projects can be assigned to promote teamwork and critical thinking. Students can work together to analyze and design heat transfer systems for specific applications. This activity encourages problem-solving skills, effective communication, and the ability to apply heat transfer principles in practical situations.

Formative Assessment: Regular formative assessments, such as quizzes, class discussions, and concept checks, can be conducted to monitor students' progress and understanding. These assessments provide feedback to both the students and the instructor, enabling targeted interventions and addressing any misconceptions or gaps in knowledge.

Student Workload (SWL)

الحمل الدراسي للطالب

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	4	5% (5)	2, 5,8,11	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	
	Report			13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Use of empirical and experimental correlations for forced convection.
Week 2	Natural convection over vertical and horizontal plans
Week 3	Natural convection in enclosure.
Week 4	Use of empirical and experimental correlations for natural convection.
Week 5	Principle of condensation and boiling.
Week 6	Thermal radiation: Concept, Black body radiation.
Week 7	Spectral and total emissive power, Stefan Boltzmann law,
Week 8	Radiation laws, irradiation and radiosity, Surface absorption, reflection and transmission, emissivity,
Week 9	Radiation view factor, radiation heat exchange between two diffuse gray surfaces, radiation shield.
Week 10	Gas radiation
Week 11	Classification of heat exchangers, temperature distribution in parallel, counter flow arrangement
Week 12	overall heat transfer coefficient, fouling factor,
Week 13	Log-mean temperature difference method.
Week 14	NTU –effectiveness method of analysis for rating and sizing of heat exchangers.
Week 15	Heat exchanger, design, and selection, practical applications, heat pipe.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Conduction-Convection System; Extended Surfaces
Week 4	Lab 2: Forced Convection
Week 7	Lab 3: Natural Convection
Week 10	Lab 4: Heat Exchanger

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	J. P. Holman, Heat Transfer, 10th ed., McGraw Hill, NY,2010	Yes
Recommended Texts	Incropera, F. P., DeWitt, D. P., Bergman, T. L., & Lavine, A. S. (2013). Fundamentals of heat and mass transfer. Wiley.	No
Websites	https://sites.google.com/uobabylon.edu.iq/heat-transfer-virtual-lab/home	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Renewable Energy Resources</u>	Module Delivery	
Module Type	<u>Core</u>	<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<u>UOBAB0104065</u>		
ECTS Credits	<u>4</u>		
SWL (hr/sem)	<u>60</u>		
Module Level	UGIII	Semester of Delivery	8

Administering Department	CH	College	EN
Module Leader	Ahmed Amer AL-Salman	e-mail	Ahmed.a.alsalman@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	MS.c.
Module Tutor	None	e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	13/11/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> To discover the important of renewable energy. To learn about the various types of renewable energy resources. To find out the applications of the renewable energy. To understand the impact of using renewable energy on the society.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> Recognize alternative sources of energy. List the various terms associated with renewable energy. Identify the operations principles of renewable energy resources. Identify the various applications of renewable energies. Recognize the sustainability of renewable energy resources.
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none"> Introduction to renewable energy resources. Advantages and limitations of renewable energy resources. Solar energy. Wind energy. Hydropower, tidal power and ocean thermal energy. Energy from biomass. Geothermal energy.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>1- The Presentation method: The teaching item in this method will be displayed in front of the students on the whiteboard in details.</p> <p>2- The discussion method: Each item will be discussed with the students and allowing to them to give their opinion and comments about the whole parts of the lecture.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	105		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المناهج الأسبوعي النظري

Material Covered

Week 1	Introduction
Week 2	Renewable energy and Sustainability
Week 3	Advantages and Draw back of Renewable Energy Sources
Week 4	Solar Energy
Week 5	Passive Solar
Week 6	Direct Solar
Week 7	Radiation
Week 8	Flat Collectors
Week 9	Concentrating Collectors
Week 10	Photovoltaic Cells
Week 11	Photovoltaic System
Week 12	Wind Energy
Week 13	Hydro Power
Week 14	Biomass
Week 15	Geothermal Power
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Solar heating
Week 2	Lab 2: Solar cooling
Week 3	Lab 3: Photovoltaic cell
Week 4	Lab 4: Power from wind

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. John Twidell and Tony Weir, Renewable Energy Resources, 3 rd Edition, Routledge, 2015.	Yes

Recommended Texts	<ol style="list-style-type: none"> Putnam, Energy from the Wind, Prentice Hall of India, 2004. Antonio Luque and Steven Hegedus, Handbook of Photovoltaic Science and Engineering, John Wiley & Sons Ltd, 2003. 	No
Websites		

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