

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Mathematics I		Module Delivery	
Module Type	Basic learning activities		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	ENG111			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGI	Semester of Delivery	1	
Administering Department		College		
Module Leader	Dr. Baleegh Saud Alobaid		e-mail	Baleegh.saud@mu.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		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 course will cover the materials : Functions and Graphs, Identifying Functions; Even & Odd Functions, Functions and Graphs, Combining Functions; Shifting and Scaling Graphs, Trigonometric Functions, limits and continuity, One-Sided Limits and Limits at Infinity. Differentiation Rules, integration, applications of integrals, Applications of Derivatives.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Students will recognize problem-solving techniques - Appropriate to a given situation, including the development of mathematical models the identification of assumptions, - The understanding of the limitations of models, and the use of both graphical and numerical methods.
Indicative Contents المحتويات الإرشادية	<u>FUNCTIONS AND GRAPHS</u> <u>LIMITS AND CONTINUITY</u> <u>DIFFERENTIATION</u> <u>APPLICATIONS OF DERIVATIVES</u> <u>INTEGRATION</u> <u>APPLICATIONS OF INTEGRAL</u>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Group assignments in the classroom, the students will practice solving some questions; Homework, the students will practice solving questions on his/her own. Pop quizzes will cover the material previously discussed in class. The monthly arranged exam will cover specific topics from the lectures. The final exam will cover all materials which were discussed in class.
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Student Workload (SWL)

الحمل الدراسي للطلاب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	88	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	6
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% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	L1- Functions and Graphs T1- PRELIMINARIES

	R1- Domain & Range
Week 2	L2- PRELIMINARIES- Absolut value, Lines, Circles, and Parabolas1 T2- PRELIMINARIES
Week 3	L3- Functions and Graphs T3-Lines, Circles, and Parabolas
Week 4	امتحان شهري ١
Week 5	L 4- Identifying Functions; Even & Odd Functions T4- Identifying Functions; Even & Odd Functions
Week 6	L5- Combining Functions; Shifting and Scaling Graphs T5- Combining Functions; Shifting and Scaling Graphs
Week 7	L6- Trigonometric Functions T6- Trigonometric Functions
Week 8	L7-LIMITS AND CONTINUITY T7-LIMITS AND CONTINUITY
Week 9	L7-LIMITS AND CONTINUITY T7-LIMITS AND CONTINUITY
Week 10	L8-LIMITS AND CONTINUITY T8-LIMITS AND CONTINUITY
Week 11	Exam.
Week 12	L8-LIMITS AND CONTINUITY T8-LIMITS AND CONTINUITY
Week 13	L8-LIMITS AND CONTINUITY T8-LIMITS AND CONTINUITY
Week 14	L9-One-Sided Limits and Limits at Infinity T9-One-Sided Limits and Limits at Infinity
Week 15	L9-One-Sided Limits and Limits at Infinity T9-One-Sided Limits and Limits at Infinity
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Joel R. Hass, Maurice D. Weir, Thomas - University Calculus Early Transcendentals- (2015). - Joel R. Hass, Christopher E Heil, Przemyslaw Bogacki, Maurice D Weir, George B. Thomas, University Calculus Early Transcendentals (4th Edition) (2019). - James Stewart, Calculus, Early Transcendentals, 7th Edition Brooks Cole (2012)	Yes
Recommended Texts	Gilbert Strang, Edwin Herman, Calculus Volume 1 by OpenStax (2016)	Yes
Websites	www.openstax.org/details/calculus-volume-1	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Physics		Module Delivery
Module Type	Basic		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE112		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level		UGI	
Administering Department		Chemical	College
Module Leader		Sattar Farhan Ali	e-mail
Module Leader's Acad. Title		Assist.Lect	Module Leader's Qualification
Module Tutor		-	e-mail
Peer Reviewer Name		-	e-mail
Scientific Committee Approval Date		15/06/2023	Version Number
			1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	After successful completion of the module, students should be able to: 1. Introduction to physics and physical quantities, including: introduction to atomic physics; oscillatory motion. 2. To understand volt Newton's Laws of Motion, first law, second law- acceleration, force and mass ,third law. 3. . To understand Fluid Mechanics Temperature and Thermodynamics 4. This is the basic subject for describe Moving fluids and continuity principle; Static fluids and Pascal's law ,flow and Poiseuille's equation. 5. To understand First and second law of thermodynamics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course student should demonstrate the following outcome relevant to Engineering physics 1- Demonstrate conceptual understanding of fundamental physics principles. 2- Apply concepts in interference and diffraction to solve relevant of engineering applications. 3- Define and apply the concepts of limits and continuity to the mentioned functions and study them. 4- To understand Fluid Mechanics Temperature and Thermodynamics of fundamental physics principles. 5- An ability to identify ,formulate and solve physics equations.
Indicative Contents	indicative content includes the following.

المحتويات الإرشادية	Introduction to concept of engineering physics and its relevance to civil engineering, Fundamental science , objective of physics [5 hrs]. (Newton's Laws of Motion, first law –Inertia ,second law-acceleration, force and mass ,third law –action –reaction [15 hrs]. Rotational and lateral movement; Harmonic, damped and forced oscillations; [15 hrs]. First and second law of thermodynamics; Principles of electric and magnetic fields; [20 hrs]. Introduction to Atomic bonding; Attractive and repulsive forces; Chemical bonds; Crystal structures; Amorphous solids and polymers; Microscopic defects in solids, [10 hrs]. Basics of elasticity theory; Brittle fracture and microcracks; Plastic deformation; [15 hrs]. Moving fluids and continuity principle; Static fluids and Pascal's law; Buoyancy and Archimedes' Principle;Viscous flow and Poiseuille's equation. [20hrs].
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- The strategy used in this course is outcome base learning. The course will give the basics of the field and how to obtain additional information as engineers require it in their careers and will give them good opportunity to understand the methods of solving physic equations. - Different forms of teaching will be used to come across with objectives of the course. PowerPoint presentations for the head titles, definitions, graphs, and many useful illustrations with a summary at the end of each chapter will be presented and discussed.

Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	88	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
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	20% (20)	5, 11	LO #1, 2, 10 and 11
	Assignments	2	20% (20)	2, 6	LO # 3, 4, 6 and 7
	Projects / Lab.	-	-	Continuous	
	Report	-	-	-	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Introduction Engineering physics
Week 2,3	The Force and Newton's Laws of Motion
Week 4	movement Physics and Measurement Vectors
Week 5,6	First and second law of thermodynamics

Week 7	Principles of electric and magnetic fields
Week 8	Static Equilibrium and Elasticity
Week 9,10	Fluid Mechanics Temperature and Thermodynamics
Week 11	Rotational and lateral movement; Harmonic, damped and forced oscillation
Week 12	Introduction to Atomic bonding; Attractive and repulsive forces; Chemical bonds; Crystal structures; Amorphous solids and polymers; Microscopic defects in solids
Week 13	Basics of elasticity theory; Brittle fracture and microcracks; Plastic deformation
Week14,15	Moving fluids and continuity principle; Static fluids and Pascal's law; Buoyancy and Archimedes' Principle;Viscous flow and Poiseuille's equation.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to lab work
Week 2	Applications Newton's Laws of Motion
Week 3	Measurements
Week 4	Fluid laboratory
Week 5	Applications movement Physics
Week 6	Static fluids, Static pressure , hydrostatic pressure
Week 7	Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	Engineering physics, Dr. Hasan Maridi , British university in Yemen	No (only electronic version)
Recommended Texts	Physics for Scientists and Engineers (with Physics NOW and info Trac), Raymond A.Seway –Emeritus ,James Madison university,Tomson Brooks /Cole @2004, 6 th Edition , 1296 pages	No (only electronic version)
Websites	https://sites.google.com/site/hasanmaridi	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Chemical Eng. Principle I		Module Delivery	
Module Type	Core		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE113			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGI	Semester of Delivery		1
Administering Department		College		
Module Leader	Dr. Ahmed Hasan Ali		e-mail	dr.ahmedha@mu.edu.iq
Module Leader's Acad. Title	Prof.		Module Leader's Qualification	Ph.D.
Module Tutor			e-mail	
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date			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 module aims to teach students the basics of balancing matter and energy, basic mathematical operations in chemical engineering, and train them to develop their ability to solve problems in practice.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- In the successful complete of this module the students would be able to : 2- Know the conception of units , operating with units , dimensions , mole , density, concentration and pressure and to do their calculation. 3- Do materials and energy balance for processes. 4- Understand the conception of ideal gas and real gas and to do related calculations.
Indicative Contents المحتويات الإرشادية	Dimensions, units, And their conversion Moles, density,And concentration Choosing a basis Temperature Pressure Introduction to Material balances A general strategy For solving material Balance problems Solving material Balance problems For single units Without reaction The chemical Reaction equation And stoichiometry Material balances For processes Involving reaction Material balance Problems involving Multiple units Recycle, bypass,Purge, and the Industrial application Of material balances

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Class learning 2- Tutorial of problems solving. 3- Self-study. 4- Tests. 5- Workshops.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	113	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Engineering Calculations, Units
Week 2	Dimensions
Week 3	Basis
Week 4	Temperature and Pressure
Week 5	Conversion, Yield, Selectivity
Week 6	Purge
Week 7	Percent of Completion in Chemical Reactions
Week 8	Material Balance without Chemical Reaction
Week 9	Material Balance without Chemical Reaction
Week 10	Examination
Week 11	Material Balance with Chemical Reaction
Week 12	Material Balance with Chemical Reaction
Week 13	Material Balance with Chemical Reaction
Week 14	Recycle.
Week 15	Examination
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Basic principles and calculations in chemical engineering	Yes
Recommended Texts		

Websites	
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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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Engineering drawing		Module Delivery	
Module Type	Suport or related learning activity		☐ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	ENG114			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGI	Semester of Delivery		1

Administering Department		College	
Module Leader	Dr. Ahmed Rajih Wetaify	e-mail	ah.ra34@mu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to Engineering drawings can be produced to a good professional standard if the following points are observed the types of lines used must be of uniform thickness and density, eliminate fancy printing, shading and associated artistry, include on the drawing only the information which is required to ensure accurate clear communication, use only standard symbols and where no other method of specification exist and appropriate abbreviations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-use the technical drawing tools properly and to plot pictures according to the dimensions and properties of technical drawing papers. 2-recognizes the technical drawing pens and pencils. Performs drawing exercises with ruler, compass, t-square and miter. 3-learns the standart paper dimensions and paper types. 4-knows to enfold a large paper to A4 dimensions. 5-performs the picture localization planning to standart papers. 6-Relates a relationship between planes and transisions between planes

	7-Adapts scale, types of scales and measurement techniques to drawings.
Indicative Contents المحتويات الإرشادية	drawing operations curves and scales objective is also to visualize projections clips the techniques of constructing the various types of polygons

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This is an introductory module for 1st year engineering students to the area of graphics of engineering design and construction may very well be the most important course of all studies for an engineering or technical career. The course will introduce general aspects of graphic communication like geometric construction, orthographic projections etc. There will be two Quizzes during the semester. The strategy used in this course is outcome base learning. It is to test achievement of learning outcomes and changing upon. including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. Add Hole Tapping Needs to Your Drawing. Include Dimensions of Only Critical and Measurable Features.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	53	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem)	100		

الحمل الدراسي الكلي للطالب خلال الفصل	
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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	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	تعريفية على ادوات الرسم الهندسي وكيفية استخدامها انواع الورق
Week 2	تعريف انواع الخطوط و طريقة كتابة الحروف والارقام
Week 3	العمليات الهندسية
Week 4	نضريات الاسقاط - رسم المساقط المتعددة ١
Week 5	امتحان شهري-١
Week 6	نضريات الاسقاط- رسم المساقط المتعددة + ٢ وضع الابعاد
Week 7	نضريات الاسقاط- رسم المساقط المتعددة ٣
Week 8	نضريات الاسقاط- رسم المساقط المتعددة ٤
Week 9	رسم المساقط المتعددة-مراجعة
Week 10	امتحان شهري- ٢
Week 11	استنتاج ورسم رسم المسقط الثالث ١
Week 12	استنتاج ورسم رسم المسقط الثالث ٢
Week 13	استنتاج ورسم رسم المسقط الثالث ٣

Week 14	استنتاج ورسم رسم المسقط الثالث ٤
Week 15	مراجعة المادة
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. A Textbook of Engineering Drawing: for Undergraduate Engineering Students Paperback , 2020	Yes
Recommended Texts	The Theory of Engineering Drawing: Retro Restored Edition Paperback, 2021	Yes
Websites		

Grading Scheme مخطط الدرجات				
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Computer Science		Module Delivery
Module Type	Basic learning activities		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	UNI115		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGI	Semester of Delivery	1
Administering Department		College	
Module Leader	Karrar AbdAlmeer	e-mail	alakoulykarrar@mu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		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	a) A key component of our mission is to make our students ‘professional,’ which to us sets the bar of not only teaching students how to develop software but also preparing them for a b) new career in software development. We train our students on much more than necessary programming skills and emphasize the soft career skills and networking needed to get into the right jobs. c) Identify the main types of computers, including supercomputer, mainframe, microcomputer, notebook, tablet, handheld. d) Describe the four functions of the computing cycle (i.e., input, processing, output, storage) e) Identify the types and purposes of specialized input devices, including game controller, stylus, barcode reader, f) Compare various data storage devices, including flash drive, external hard drive, memory card, discs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Per the Department’s program assessment outcomes, by the end of this course you should demonstrate the following relevant to statistics methods: 1) an ability to apply knowledge of types of computer software 2) Computer networks.3)Information and coding theory
Indicative Contents المحتويات الإرشادية	<u>Hardware</u> <u>Word</u> <u>Excel</u>

	<u>Power point</u> <u>network</u> <u>security</u>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2.Grading: •Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. •Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. •Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Computer Fundamentals
Week 3	Classification of Computers
Week 4	Computer Components
Week 5	Factors that must be Considered when buying a Computer

Week 6	Computer Safety
Week 7	Software Licenses
Week 8	Malware
Week 9	Computer Viruses
Week 10	Computer Damage to Health
Week 11	Operating Systems
Week 12	Introduction to Operating Systems Windows 7
Week 13	Some Common Situations & Setting in Windows 7
Week 14	Introduction
Week 15	Computer Fundamentals
Week 16	Classification of Computers
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Windows
Week 2	Work with icons
Week 3	use windows
Week 4	files and folders
Week 5	Accessories
Week 6	The main interface of Microsoft Word / general settings
Week 7	Texts/graphics/tables
Week 8	Dealing with slides and creating presentations (power point)
Week 9	Backgrounds and Themes / Transition Effects / Animations tab
Week 10	Slide Show/Print and Presentation Tab
Week 11	Dealing with Microsoft Office Excel
Week 12	Mathematical and arithmetic functions
Week 13	Statistical functions

Week 14	Boolean/conditional function (IF)
Week 15	COUNTIF,VLOOKUP Function
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	"What is Computer Science? - Computer Science. The University of York". www.cs.york.ac.uk. Retrieved June 11, 2020.	Yes
Recommended Texts	"Computer science pioneer Samuel D. Conte dies at 85". Purdue Computer Science. July 1, 2002. Retrieved December 12, 2014.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Arabic Language		Module Delivery
Module Type	Support		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	UNI116		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGI	Semester of Delivery	1
Administering Department	Chemical	College	Engineering
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D.
Module Tutor	-	e-mail	-
Peer Reviewer Name	-	e-mail	-
Scientific Committee Approval Date	15/06/2023	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	أهداف الدرس تتلخص في الآتي: ١. تمكين الطالب من كتابة التقارير باللغة العربية بشكل صحيح وتجنب الأخطاء اللغوية والإملائية والأسلوبية. ٢. تطوير قدرة النطق الفصيح لدى الطالب للتمكن من التواصل بحرفية خلال العمل. ٣. توسعة فهم الأدب العربي لانماء أساليب الكتابة في العربية. ٤. توسعة القدرة على التعبير وطرح الأفكار بلغة عربية رصينة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	يفترض بالانتهاء من تدريس هذه المادة أن يكون الطالب قد تحصل على القدرات التالية: ١. القدرة على التواصل بمهارة شفهيًا مع فرد أو مجموعة من الأشخاص بوسائل البيان اللغوية وفي الكتابة بالعربية على مستويات إدارية مختلفة. ٢. القدرة على إدراك الضرورة المستمرة لنمو المعرفة باللغة العربية والكتابة المهنية وكيفية العثور على المعلومات حولها وتطبيقها بشكل صحيح. ٣. القدرة على التحدث والكتابة بشكل مناسب دون أخطاء في القواعد العربية الأساسية. ٤. القدرة على الكتابة بشكل مناسب دون أخطاء في الإملاء.
Indicative Contents المحتويات الإرشادية	مراجعة الكلمة وأقسامها، المعرب والمبني، وأفعال الماضي والمضارع والأمر وأحوالها (٥ ساعات)، مراجعة العلامات الفرعية التي تلحق بالأفعال والأسماء (٥ ساعات)، همزات القطع والوصل، الهمزة المتوسطة، وعلامات الترقيم (٥ ساعات)، الجمل الاسمية والفعلية (٥ ساعات)، التاء المربوطة والتاء المفتوحة (٥ ساعات)، الحروف الناسخة والأفعال اللازمة والمتعدية (٥ ساعات)، أدوات الجر (٥ ساعات)، نماذج من النصوص العربية (١٠ ساعات)، أخطاء شائعة في الكتابة بالعربية (١٥ ساعة)، أمثلة تطبيقية لكتابة التقارير بالعربية (٤٠ ساعة).

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	تقوم استراتيجية التعلم على التغيير المستمر بحسب مخرجات التعلم ومدى تحققها. سيركز استاذ المادة على الأخطاء اللغوية الشائعة ومحاولة تفاديها بالنسبة للطلبة عند استعمالهم اللغة في مجالات العمل.
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	سيركز أيضا خلال الدرس على ثلاثة عناصر رئيسية وهي القواعد، والاملاء والأدب لتحسين قدرة الطالب للتواصل شفويا وكتابيا باللغة العربية.
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Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	30% (30)	6, 11	LO # 1-4
	Assignments	2	10% (10)	4, 10	LO # 1-4
	Projects / Lab.	-	-	-	-
	Report/lab.	-	-	-	-
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-4
	Final Exam	5 hr	50% (50)	16	LO # 1-4
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered

Week 1	مراجعة الكلمة واقسامها، المعرب والمبني، وأفعال الماضي والمضارع والامر واحوالها
Week 2	مراجعة العلامات الفرعية التي تلحق بالافعال والاسماء
Week 3	همزات القطع والوصل، الهمزة المتوسطة، وعلامات الترقيم
Week 4	الجملة الاسمية والفعلية
Week 5	التاء المربوطة والتاء المفتوحة
Week 6	الحروف الناسخة والافعال اللازمة والمتعدية
Week 7	أدوات الجر، والمجرور بحرف الجر والمجرور بالاضافة
Week 8	نماذج من النصوص العربية
Week 9	نماذج من النصوص العربية (تواصل للدرس السابق)
Week 10	أخطاء شائعة في الكتابة
Week 11	أخطاء شائعة في الكتابة (تواصل للدرس السابق)
Week 12	أخطاء شائعة في الكتابة (تواصل للدرس السابق)
Week 13	أمثلة تطبيقية لكتابة التقارير بالعربية
Week 14	أمثلة تطبيقية لكتابة التقارير بالعربية (تواصل للدرس السابق)
Week 15	أمثلة تطبيقية لكتابة التقارير بالعربية (تواصل للدرس السابق)
Week 16	مراجعة

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<u>الميسر في اللغة العربية: المستوى الاول: النحو والصرف والاملاء، سمير بن يحيى المعبر، دار حافظ، المملكة العربية السعودية، جدة، ١٤٢٣ هـ، ٢٠٠٣ م.</u>	كلا (النسخة الالكترونية فقط)
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics II		Module Delivery
Module Type	Basic learning activities		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	ENG121		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGI	Semester of Delivery	2
Administering Department		College	
Module Leader	Dr. Baleegh Saud Alobaid		e-mail Baleegh.saud@mu.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		Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG111	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The course will cover the materials : Functions and Graphs, Identifying Functions; Even & Odd Functions, Functions and Graphs, Combining Functions; Shifting and Scaling Graphs, Trigonometric Functions, limits and continuity, One-Sided Limits and Limits at Infinity. Differentiation Rules, integration, applications of integrals, Applications of Derivatives.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Describe mathematical ideas from multiple perspectives. - Explain fundamental mathematical concepts or analyses of real-world problems to non-mathematicians.
Indicative Contents المحتويات الإرشادية	<u>FUNCTIONS AND GRAPHS</u> <u>LIMITS AND CONTINUITY</u> <u>DIFFERENTIATION</u>

	<u>APPLICATIONS OF DERIVATIVES</u> <u>INTEGRATION</u> <u>APPLICATIONS OF INTEGRAL</u>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Group assignments in the classroom, the students will practice solving some questions; Homework, the students will practice solving questions on his/her own. Pop quizzes will cover the material previously discussed in class. The monthly arranged exam will cover specific topics from the lectures. The final exam will cover all materials which were discussed in class.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	88	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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
Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Differentiation Rules
Week 2	Derivatives of Trigonometric Functions
Week 3	Derivatives of Logarithmic Functions
Week 4	امتحان شهري
Week 5	Applications of Derivatives
Week 6	Minimum point
Week 7	Maximum point
Week 8	Integration
Week 9	Definite integral
Week 10	Indefinite integral
Week 11	Methods of Integration
Week 12	Integration by formula, integration by parts
Week 13	Integration by substitution,
Week 14	Trigonometric substitution
Week 15	Applications of Definite Integrals
Week 16	Matrix

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Joel R. Hass, Maurice D. Weir, Thomas - University Calculus Early Transcendentals- (2015). - Joel R. Hass, Christopher E Heil, Przemyslaw Bogacki, Maurice D Weir, George B. Thomas, University Calculus Early Transcendentals (4th Edition) (2019). - James Stewart, Calculus, Early Transcendentals, 7th Edition Brooks Cole (2012)	Yes
Recommended Texts	Gilbert Strang, Edwin Herman, Calculus Volume 1 by OpenStax (2016)	Yes
Websites	www.openstax.org/details/calculus-volume-1	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Chemistry		Module Delivery
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE122		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGI	Semester of Delivery	2
Administering Department	Chemical engineering	College	Engineering
Module Leader	Ali Salih Jafer	e-mail	Ali.salih@mu.edu.iq
Module Leader's Acad. Title	Lecturer	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	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	(a) Understand the concept of analytical chemistry. (b) Understanding and calculating some properties of substances such as equivalent weight and molecular weight. (C) Knowing the methods and laws of calculating concentrations of substances and the relationship between them. (d) Understand the physical properties of materials and methods for their calculation. (e) Identify and calculate the acidity function (f) Understand acids and bases and their equilibrium states. (g) Knowing about titration, its methods, and its importance. (h) Understand weak acids, strong bases, and the resulting salts (i) Knowledge the concept of organic chemistry (j) Methods for naming organic compounds (j) Knowledge of the physical and chemical properties of organic compounds (k) Learn how to prepare organic compounds (l) Know the chemical reactions of organic compounds
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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) the ability to apply knowledge of mathematics and chemical processes, 2) the ability to calculate certain physical properties, 3) the ability to recognize the properties of materials and their relationship production and action, 4) the ability to recognize the acid function, its importance and how to calculate it, 5) an understanding of professional and ethical responsibility, 6) the ability to communicate effectively, 7) the education necessary to understand the impact of an engineering solution in a global, economic, environmental and societal context, and 8) the ability to Use the techniques, skills, and modern engineering tools necessary for engineering practice. (9) Understand the general organic chemistry (10) Understand the alkanes (11) Explain the alkenes (12) Understand the alkynes (13) Explain the halides alkyl (14) Explain the cycloalkanes (15) Understand the aromatic hydrocarbons (16) Understand alcohols (17) Understand aldehydes and ketones (18) Understand the carboxylic acids
Indicative Contents المحتويات الإرشادية	Introduction to Analytical Chemistry ,Equivalent weight, Mole ,Atomic weight ,Molecular weight ,Molarity and Normality and relation between them ,Density and specific gravity ,Weight Percentage ,Acid – base equilibria and pH of solutions Expression of equilibrium constant in acidic and basic medium ,Calculation of pH of aqueous solution ,salt of weak acid and strong base ,Analysis of samples by titration with standard solution ,Titration curves ,Gravimetric analysis. Learn about organic chemistry in general, define it and classify it according to its types and compounds. Aliphatic compounds (alkanes, alkenes, alkynes), their chemical composition, naming methods, physical properties, methods of preparation, and chemical reactions. cyclic compounds, their chemical composition, naming methods, physical properties, methods of preparation and chemical reactions. Aromatic compounds, their chemical composition, naming methods, physical properties, methods of preparation, and chemical interactions..

	Alcohols, carboxylic acids, alkyl halides, aldehydes and ketones, their chemical composition, naming methods, physical properties, preparation methods and chemical reactions.
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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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Formative assessment	Quizzes	2	10% (10)	5, 10	LO # 1-7
	Assignments	2	10% (10)	2, 12	LO # 1-7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 1-7
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	Introduction of organic chemistry
Week 2	Classification of organic chemistry compounds
Week 3	Alkanes , Alkenes , Alkynes and Alcohols
Week 4	Aldehydes , Ketones
Week 5	Carboxylic acids
Week 6	Alkyls Halides
Week 7	Cyclo alkanes
Week 8	Aromatic compounds
Week 9	Introduction to Analytical Chemistry
Week 10	Equivalent weight, Mole , Atomic weight , Molecular weight
Week 11	Molarity and Normality , Chemical Stoichiometry
Week 12	Density and specific gravity , Weight Percentage
Week 13	Acid – base equilibria and pH of solutions, Expression of equilibrium constant in acidic and basic medium
Week 14	Calculation of pH of aqueous solution , salt of weak acid and strong base
Week 15	Calculation of the pH of buffer solution , Titration curves : Direct titration and back titration
Week 16	Electromotive Force and Nernst Equation

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Laboratory Tools
Week 2	Density and specific gravity
Week 3	Melting Point , Boiling Point
Week 4	Extraction , Sublimation
Week 5	Distillation , Recrystallization
Week 6	Preparation of Ethyl acetate , Preparation of Soap
Week 7	Preparation of Aspire , Cyclohexane
Week 8	Detection of active group
Week 9	Preparation of the solid solutions
Week 10	Preparation of solutions of a liquid substance of a certain concentration
Week 11	Determine the molarity of a secondary standard solution
Week 12	Calibration of a sulfuric acid solution of unknown concentration using a standard solution of potassium hydroxide
Week 13	Determine the molarity of a mixture of hydroxide and sodium carbonate
Week 14	The acidity of vinegar , Titration of polyprotic acids (polybasic)
Week 15	Determine the concentration by Homer method , Volhard method and Fajan method

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	*Jonathan Clayden - Blackwell's	Yes

	*Basic Principles of Analytical Chemistry, dr. Najat Juma Saleh, University of Technology, Baghdad.	
Recommended Texts	*John McMurry's Organic Chemistry *Skoog A. Douglas , "Fundamental of Analytical Chemistry ", 8 th edition , Canada (2004) *Daniel C .Harris , "Quantitative chemical Analysis", 6 th edition , U.S. (2003).	Yes

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Chemical Eng. Principle II	Module Delivery
Module Type	Core learning activity	☐ Theory

Module Code	CHE123			☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		UGI	Semester of Delivery		2
Administering Department			College		
Module Leader	Dr. Ahmed Hasan Ali		e-mail	dr.ahmedha@mu.edu.iq	
Module Leader's Acad. Title		Prof.	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date			Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	CHE113	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The module aims to teach students the basics of balancing matter and energy, basic mathematical operations in chemical engineering, and train them to develop their ability to solve problems in practice.
Module Learning Outcomes	1-In the successful complete of this module the students would be able to :

مخرجات التعلم للمادة الدراسية	2-Know the conception of units , operating with units , dimensions , mole , density, concentration and pressure and to do their calculation. 3-Do materials and energy balance for processes. 4-Understand the conception of ideal gas and real gas and to do related calculations.
Indicative Contents المحتويات الإرشادية	Ideal gas Real gas s:Compressibility Real gases: Equations of state Single-component Two-phase systems (vapor pressure) Energy: terminology, Concepts, and units Introduction to Energy balances For processes Without reaction Calculation of Enthalpy changes Applications of Energy balance In the absence of chemical reactions

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Class learning Tutorial of problems solving. Self-study. Tests. Workshops.

Student Workload (SWL) الحمل الدراسي للطلاب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	113	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	7.6

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175
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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	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Gases
Week 2	Vapors
Week 3	Liquids and Solids.
Week 4	Ideal Gas.
Week 5	Ideal Gas.
Week 6	Mixture of Ideal Gases.
Week 7	Mixture of Ideal Gases.
Week 8	Vapor Pressure
Week 9	Mixture of Gas.
Week 10	Examination
Week 11	Saturated Vapor.
Week 12	Partial Saturation And Humidity.

Week 13	Energy Balance.
Week 14	Calculation of Thermal Content.
Week 15	Examination
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Basic principles and calculations in chemical engineering	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
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Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Human Rights and Democracy		Module Delivery
Module Type	Support		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	UNI124		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGI	Semester of Delivery	2
Administering Department	Chemical	College	Eng.
Module Leader	يونس شعيل عجيل	e-mail	
Module Leader's Acad. Title	مدرس	Module Leader's Qualification	Ph. D.
Module Tutor		e-mail	
Peer Reviewer Name	Scientific Committee	e-mail	E-mail
Scientific Committee Approval Date	15/06/2023	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	(١) تعريف شامل ومركز بحقوق الإنسان ابتداء من جذور نشأتها والتطورات التي شهدتها هذه الحقوق الإنسانية عبر العصور والمجتمعات البشرية وإسهام الشرائع السماوية والأديان والحضارات في رفدها بالقيم والمثل مروراً بمختلف العصور. (٢) بيان الاعتراف الدولي بهذه الحق وق من قبل المنظمات الدولية، وفي مقدمتها الأمم المتحدة، ثم الاعتراف الإقليمي في مختلف بقاع العالم. (٣) دور المنظمات غير الحكومية المعنية بحقوق الإنسان وقانون الدولة الإنساني وأهداف تلك المنظمات ووسائل عملها ودورها في تطور احترام وحماية حقوق الإنسان. (٤) الضمانات العملية لحقوق الإنسان على الصعيد الوطني في الدساتير والتشريعات الوطنية متمثلة بالضمانات الدستورية والقضائية، ثم الضمانات السياسية إلى جانب الدور الذي تقوم به المنظمات الوطنية المعنية بحقوق الإنسان في الدفاع عن هذه الحقوق وحمايتها. (٥) دور الأمم المتحدة وأجهزتها ووكالاتها المختصة في احترام وحماية حقوق الإنسان وكذلك دور المنظمات الإقليمية في ها الميدان. (٦) دور المنظمات الحكومية سواء على المستوى العالمي أو على المستوى الإقليمي في حماية واحترام حقوق الإنسان (٧) تفعيل العقل والتفكير والإبداع والحرص على المشاركة الديمقراطية بكل تفاصيلها ومبادئ العدالة الاجتماعية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	(١) إمداد الطلاب بأكثر قدر ممكن من المعلومات والمعارف التي تمكنهم من الوقوف على حقوق الإنسان من حيث مفهومها وأهدافها ومبادئها وأهمية تطبيقها في حياتهم، ليعرفوا ما لهم من حقوق وما عليهم من واجبات تجاه دينهم وبلادهم وأمتهم والناس أجمعين. (٢) إكساب الطلاب القدرة على التعلم الذاتي والتعليم المستمر باعتبارهما من أهم أساليب النمو المعرفي والتكيف مع المستجدات العلمية والعملية في مجال حقوق الإنسان. (٣) القيم والممارسات الأخلاقية المهنية التي ترتبط بقوانين وتشريعات حقوق الإنسان. (٤) إيقاف الطلاب على طرق الاستفادة من التقنيات المعاصرة التي جاءت بها العولمة، والمتمثلة في الفضائيات والحاسب الآلي والأنترنت، وأنها تتيح لهم فرص الاطلاع على المعلومات والمعارف المختلفة المتعلقة بحقوق الإنسان، سواء ذات العلاقة بالمجال المحلي أو الإقليمي أو العالمي، بما في ذلك ما يصدر من قوانين دولية عن منظمات حقوق الإنسان. (٥) إمكانية جعل الطالب واعياً لحقوق الإنسان ليساعد الناس على فهم حقوقهم وواجباتهم. (٦) تدريب الطلبة على تطبيق حقوق الإنسان والحرية والديمقراطية في الحياة اليومية. (٧) تمكين الطالب من دراسة أهم الحقوق التي تضمنتها له الشريعة الإسلامية والدساتير العراقية لا سيما الدستور النافذ لسنة ٢٠٠٥ فضلاً عن معرفة الطالب للمواثيق الدولية التي صدرت بخصوص حقوق الإنسان.
Indicative Contents المحتويات الإرشادية	(١) تعميم ثقافة حقوق الإنسان لعموم المجتمع وبالأخص العملية التعليمية (٢) ضمان تنشئة أجيال متعاقبة تقوم على معرفة القوانين والتشريعات الخاصة بحقوق الإنسان. (٣) تفعيل العقل والتفكير والإبداع والحرص على المشاركة الديمقراطية بكل تفاصيلها ومبادئ العدالة الاجتماعية

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	(١) أسلوب المحاضرة إذا يتخلل المحاضرات الحوار الهادف والمناقشة البناءة بين الطلاب والأستاذ. (٢) التعلم التعاوني.. وذلك تقسيم الطلاب إلى مجموعات صغيرة وتمكينهم من مناقشة أفكار الدرس المختلفة بعد تضمينها المعلومات التي تتعلق بقضية أو مشكلة تتعلق بحقوق الإنسان ويطلب من الطلاب تحليلها وإبداء الرأي حولها ومناقشتها أمام كافة زملاء الصف (٣) دراسة الحالة: وذلك من خلال عرض الحالة موضوع الدراسة إي المشكلة المتعلقة بحقوق الإنسان في صورة قصة غير منتهية ويطلب من الطلاب من خلال أسئلة تُعبرها مسبقاً أن يحلوا القصة، ويناقشوها، ويبدوا آراءهم حول مضامينها، ومن ثم يصنعون النهاية المناسبة.
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Student Workload (SWL)

الحمل الدراسي للطلاب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	43	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعياً	3
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	مقدمة في تعريف حقوق الإنسان، ماهية حقوق الإنسان.
Week 2	حقوق الإنسان في المواثيق الدولية، حقوق الإنسان في المواثيق الإقليمية، حقوق الإنسان في التشريعات الوطنية
Week 3	حقوق الإنسان في الحضارات القديمة، حقوق الإنسان في الأديان السماوية، حقوق الإنسان في العصور الوسطى والحديثة
Week 4	الاعتراف المعاصر بحقوق الإنسان،
Week 5	تصنيفات حقوق الإنسان
Week 6	وسائل حماية حقوق الإنسان، ضمانات حقوق الإنسان
Week 7	الفساد الإداري وتأثيره على حقوق الإنسان
Week 8	القانون الدولي الإنساني وقانون حقوق الإنسان، تطبيق الأمم المتحدة للقانون الدولي الإنساني وقانون حقوق الإنسان.
Week 9	الحرية (مفهومها_ أهميتها، تعريفها)،
Week 10	نشأة وتطور الحريات العامة، أنواع الحريات العامة، معوقات الحرية
Week 11	دور القانون في مجال الحريات العامة، الحريات العامة وحقوق الإنسان من الترادف إلى التمايز.
Week 12	مقدمة في تعريف الديمقراطية، التطور التاريخي لمفهوم الديمقراطية (الحضارات القديمة)، التطور التاريخي لمفهوم الديمقراطية (الأديان السماوية)
Week 13	الديمقراطية في العصور الوسطى والحديثة والمعاصرة
Week 14	أشكال الديمقراطية، الشروط العامة لنجاح النظام الديمقراطي،
Week 15	مفهوم الانتخابات وتكيفها القانوني البرلمان، تطبيق النظام الديمقراطي في العراق
Week 16	تهيئة لامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
Recommended Texts	حقوق الإنسان.. الدكتور حميد حنون خالد	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	English Language I		Module Delivery	
Module Type	Support		☐ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UNI125			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGI	Semester of Delivery		2
Administering Department	Chemical	College	Eng.	
Module Leader	Dr. Baleegh Saud Alobaid		e-mail	Baleegh.saud@mu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer		Module Leader's Qualification	PhD
Module Tutor	-		e-mail	-
Peer Reviewer Name	Scientific Committee		e-mail	-
Scientific Committee Approval Date		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	Here are some common module aims that should be considered: 1. Language Proficiency Development: The aim is to enhance students' overall language proficiency in English. The module aims to help students build a solid foundation in grammar, vocabulary, and pronunciation. 2. Communication Skills: The aim is to develop students' ability to communicate effectively in various everyday situations and academic contexts. 3. Vocabulary Expansion: The aim is to expand students' vocabulary range. The module focuses on introducing and reinforcing new words, idioms, and expressions commonly used in spoken and written English. 4. Grammar Mastery: The aim is to reinforce and expand students' understanding of English grammar structures. The module aims to provide systematic grammar instruction, practice, and application in authentic contexts. 5. Independent Learning Skills: The aim is to develop students' ability to take responsibility for their own learning and become independent language learners. The module may include strategies and activities to foster self-directed learning, such as setting learning goals, self-assessment, and using online resources.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate improved listening skills by understanding main ideas, specific details, and implicit information. 2. Display enhanced reading skills by comprehending and analyzing a range of texts, such as articles, reports, short stories, and excerpts from academic texts. Identify main ideas, supporting details, and implied meanings while building vocabulary and reading fluency. 3. Expand vocabulary knowledge by acquiring new words, expressions, and idiomatic phrases related to various topics. Apply vocabulary in context and demonstrate an understanding of word meanings, synonyms, antonyms, and collocations.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Vocabulary Building: - Everyday vocabulary and expressions - Vocabulary related to various topics such as family, hobbies, work, travel, etc. - Vocabulary expansion through word families, synonyms, antonyms, and collocations 2. Grammar: - Review and reinforcement of basic grammar structures (present tenses, past tenses, future tenses, etc.) - Grammar practice through contextualized examples and exercises 3. Reading Skills: - Reading and understanding short texts, articles, and stories - Developing reading comprehension skills through exercises and questions - Building reading speed and comprehension through practice 4. Writing Skills: - Developing writing skills through guided writing activities - Writing short paragraphs and essays on various topics - Practicing sentence structure, paragraph organization, and coherence 5. Listening and Speaking Integration: - Engaging in listening activities followed by discussion and oral responses - Participating in group discussions and presentations - Practicing listening and speaking skills in real-life situations

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Communicative Approach: Emphasize active communication in the target language by encouraging students to use English in real-life situations and provide ample opportunities for them to practice speaking and listening skills. 2. Task-Based Learning: Design tasks and activities that require students to use English to complete meaningful and purposeful tasks. 3. Differentiated Instruction: Cater to the diverse learning needs and preferences of students by employing varied instructional strategies. Provide a range of activities, materials, and assessments to accommodate different learning styles, abilities, and interests.

	4. Use of Technology: Integrate technology tools and resources to enhance language learning. 5. Formative Assessment: Implement regular formative assessments such as quizzes, presentations, group projects, and class discussions to monitor student progress and provide timely feedback. Encourage self-assessment and reflection to promote learner autonomy.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.6
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	30% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
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	Tenses • Questions • Using a bilingual dictionary • Social expressions 1
Week 2	Present tenses • have/have got • Collocation - daily life • Making conversation
Week 3	Past tenses • Word formation • Time expressions
Week 4	much/many • some/any • a few, a little, a lot of • Articles • Shopping • Prices
Week 5	Verb patterns 1 , Future forms , Hot verbs , How do you feel?
Week 6	What ... like? • Comparatives and superlatives • Synonyms and antonyms • Directions
Week 7	Mid-term Exam
Week 8	Present Perfect • for, since • Adverbs, word pairs • Short answers
Week 9	have (got) to • should/must. Words that go together • At the doctor's
Week 10	Time clauses • if • Hot verbs • In a hotel
Week 11	Verb patterns 2 , manage to, used to -ed/-ing adjectives • Exclamations
Week 12	Passives , Verbs and nouns that go together , Notices
Week 13	Second conditional • might • Phrasal verbs • Social expressions 2
Week 14	Present Perfect Continuous • Word formation • Adverbs • Telephoning
Week 15	Past Perfect • Reported statements • Saying goodbye
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New Headway Pre-Intermediate Student's Book, John and Liz Soars, Plus edition	Yes
Recommended Texts	A Self-study Grammar Book for Engineers, Sonia Oliver and Monica Soler	No
Websites	https://elt.oup.com/student/headway/preint4/?cc=us&selLanguage=en	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	Workshops		Module Delivery	
Module Type	Support		☐ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	ENG126			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGI	Semester of Delivery	2	

Administering Department	Chemical	College	Eng.
Module Leader	Ali Samir	e-mail	ali.samir@mu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	M.Sc
Module Tutor	-	e-mail	-
Peer Reviewer Name	Scientific Committee	e-mail	-
Scientific Committee Approval Date		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. Develop an understanding of the importance of industrial safety in workshop environments. 2. Teach the proper structure, organization, and formatting of technical reports. 3. Provide hands-on experience in using lathes and milling for various turning and shaping operations. 4. Understanding welding processes fundamentals and techniques. 5. Familiarize students with different welding methods, such as arc welding, MIG welding, and TIG welding. 6. exploring mechanical, electrical, and plumbing systems commonly found in buildings. 7. Introduce students to the basics of carpentry and woodworking techniques.
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	8. Teach safe handling and operation of carpentry tools, such as saws, planes, and chisels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Familiarize students with safety protocols, procedures, and equipment. 2. Develop the student's skills to write engineering technical reports. 3. Develop skills in tool selection, workpiece setup, and achieving dimensional accuracy. 4. Develop skills in welding joint preparation, welding bead formation, and weld quality assessment. 5. Develop skills in reading and interpreting MEP drawings, schematics, and specifications. 6. Develop skills in measuring, marking, cutting, joining, and finishing woodwork projects.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Hands-on Practice: Provide suitable opportunities for students to engage in hands-on practical exercises relevant to the workshop topic. This could include operating workshop equipment, practicing techniques. 2. Demonstrate workshop processes, techniques, and safety procedures to the students. 3. Offer guided instruction where students receive individual or small group guidance and feedback from instructors or experienced practitioners. 4. Encourage collaboration among students by assigning group projects or activities that require teamwork. 5. Implement ongoing assessment methods , such as quizzes, practical assessments, or project evaluations, to monitor students' progress and provide opportunities for reinforcement and remediation.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	53	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.6
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	30% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
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 الأسبوعي النظري

	Material Covered
Week 1	Tenses • Questions • Using a bilingual dictionary • Social expressions 1
Week 2	Present tenses • have/have got • Collocation - daily life • Making conversation

Week 3	Past tenses • Word formation • Time expressions
Week 4	much/many • some/any • a few, a little, a lot of • Articles • Shopping • Prices
Week 5	Verb patterns 1 , Future forms , Hot verbs , How do you feel?
Week 6	What ... like? • Comparatives and superlatives • Synonyms and antonyms • Directions
Week 7	Mid-term Exam
Week 8	Present Perfect • for, since • Adverbs, word pairs • Short answers
Week 9	have (got) to • should/must. Words that go together • At the doctor's
Week 10	Time clauses • if • Hot verbs • In a hotel
Week 11	Verb patterns 2 , manage to, used to -ed/-ing adjectives • Exclamations
Week 12	Passives , Verbs and nouns that go together , Notices
Week 13	Second conditional • might • Phrasal verbs • Social expressions 2
Week 14	Present Perfect Continuous • Word formation • Adverbs • Telephoning
Week 15	Past Perfect • Reported statements • Saying goodbye
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	New Headway Pre-Intermediate Student's Book, John and Liz Soars, Plus edition	Yes
Recommended Texts	A Self-study Grammar Book for Engineers, Sonia Oliver and Monica Soler	No
Websites	https://elt.oup.com/student/headway/preint4/?cc=us&sellLanguage=en	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Engineering Mathematics I		Module Delivery	
Module Type	Basic learning activities		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE 211			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGII	Semester of Delivery	3	
Administering Department		College		
Module Leader	Dr. Rafea Dakhil Hussein		e-mail	rafea.dakhil@mu.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		Version Number	1.0
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Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG121	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The course will cover the materials: Polar coordinates and Graphs, calculating area and line in polar coordinates, double and triple integrals, vectors, partial derivatives, series, sequences, differential equations, first and second order differential equations and D-operator.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Recognize defferint techniques and new methods. • Development of used models and the identification of assumptions, the understanding of the limitations of models. • Using both graphical and numerical methods.
Indicative Contents المحتويات الإرشادية	Overview of Polar coordinates Vectors Partial Derivatives Sequences and Series First and second – order differential equations Multiple integrals

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Group assignments in the classroom, the students will practice solving some questions; Homework, the students will practice solving questions on his/her own. Pop quizzes will cover the material previously discussed in class. The monthly arranged exam will cover specific topics from the lectures. The final exam will cover all materials which were discussed in class.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Total assessment	100% (100 Marks)		
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Polar Coordinates
Week 2	Area in the plane
Week 3	Area between polar curves
Week 4	Length of a polar curve, Area of a surface of revolution
Week 5	Vectors, The Dot product
Week 6	Vector cross product, Lines and planes in Space
Week 7	Partial Derivatives, First-Order Partial derivatives
Week 8	Second-order partial derivatives
Week 9	The Chain Rule
Week 10	Directional derivatives and Gradient vectors
Week 11	Multiple integrals
Week 12	Double integrals in cartesian form
Week 13	Double integrals in polar form
Week 14	Triple integrals in rectangular coordinates
Week 15	Triple integrals in cylindrical coordinates
Week 16	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Thomas' Calculus, Thirteenth Edition George B Thomas, Massachusetts Institute of Technology - 2013. • James Stewart, Calculus, Early Transcendentals, 7th edition Brooks Cole (2012)	Yes
Recommended Texts	• Gilbert Strang, Edwin Herman, Calculus Volume 1 by OpenStax (2016)	Yes
Websites	www.openstax.org/details/calculus-volume-1	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Fluid Flow I		Module Delivery
Module Type	Core learning activity		☐ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 212		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGII	Semester of Delivery	3
Administering Department		College	
Module Leader	Dr. Raid Tariq Hade Alkhateeb	e-mail	dr.raidt@mu.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		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	(a) Understand the concept of fluid flow. (b) Explain the physical properties of fluid. (c) Understand the dimensional analysis methods. (d) Explain the barometer and piezometer devices. (e) Explain the types of manometers. (f) Understand the types of flow. (g) Understand the flow visualization. (h) Understand the methods of describing fluid motion. (i) Explain the concepts of the Bernoulli s equation and its applications. (m) Solve problems involving physical properties of fluid, dimensional analysis, barometer and piezometer devices, types of manometers, types of flow, flow visualization, fluid motion, the total energy line and hydraulic grade line, applications of Bernoulli s equation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Demonstrate comprehensive and detailed knowledge to understanding of the concepts of fluid flow to improve the ability of chemical engineers to communicate verbally with scientific societies to visualize and explain work in a more sophisticated way 2- Developing their ability in analysis and use of modern laboratory equipment and software to operate several types of units of fluid flow. 3- Developing their ability to conduct applied research that can contribute in serving the community. 4- Apply the above understanding to the analysis and designs of different unit operations. 5-Developing their ability to collecting informational resources and understanding of professional ethics to be influential engineers in society.
Indicative Contents المحتويات الإرشادية	Overview of fluid flow physical properties of fluid and dimensional analysis Pressure and fluid statics Bernoulli s equation and Energy equations

	Fluid kinematics and Piping Networks Turbomachinery
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	2. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 3. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 4. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5
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	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Introduction to Fluid flow
Week 2	Physical Properties of Fluids
Week 3	Important Laws

Week 4	Dimensional Analysis
Week 5	Buckingham s Method
Week 6	Introduction to Fluid Statics
Week 7	Pressure Head
Week 8	Barometer and Piezometer for Pressure Measurement
Week 9	Types of Manometers
Week 10	Introduction to Kinematics of Fluid
Week 11	Fluid Visualization
Week 12	Methods of Describing Fluid Motion
Week 13	Bernoulli Equation
Week 14	Application of Bernoulli s Equation
Week 15	Orifice Plate and Pitot tube
Week 16	

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Bernoulli's Theorem Demonstration
Week 2	Bernoulli's Theorem Demonstration
Week 3	Flow through Venturi Meter (Obstruction Flowmeters)
Week 4	Flow through Venturi Meter (Obstruction Flowmeters)
Week 5	Orifice and Free Jet Flow
Week 6	Orifice and Free Jet Flow
Week 7	Determination of Coefficient of Velocity From Jet Trajectory
Week 8	Determination of Coefficient of Velocity From Jet Trajectory
Week 9	Determination of Coefficient of Discharge Under Constant Head
Week 10	Determination of Coefficient of Discharge Under Constant Head
Week 11	Determination of Coefficient of Discharge Under Varying Head
Week 12	Determination of Coefficient of Discharge Under Varying Head
Week 13	Hydrostatic Force on a Fully submerged plane surface
Week 14	Hydrostatic Force on a Fully submerged plane surface
Week 15	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	-FLUID MECHANICS: FUNDAMENTALS AND APPLICATIONS by YUNUS A. ÇENGEL & JOHN M CIMBALA., McGraw-Hill Publisher, 2003, (1st Editions).	Yes
Recommended Texts	- Fundamentals of FLUID MECHANICS by BRUCE R. MUNSON & DONALD F. YOUNG., John Wiley & Sons, Inc., 2002, (4th Editions). - FLUID MECHANICS AND HYDRAULICS by Jack B. Evett & Cheng Liu, McGraw-Hill Publisher, 1989.	Yes
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
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	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Physical chemistry I		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE 213			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGII	Semester of Delivery	3	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Anas Bdiwi Salman		e-mail	e-mail: dr.anas.bdiwi@mu.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Asst.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		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This module will introduce students to undergraduate level physical chemistry. By the end of this module students should have developed an understanding of important physical chemistry concepts, and associated mathematical concepts, to enable them to understand states of matter, chemical thermodynamics, kinetics
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the effect of P, V, T and amount of matter on the idealised behaviour of gases. 2. Use the ideal gas equation, understand the limitations of the ideal gas law and discuss the real behaviour of gases. 3. Understanding the nature and classifications of processes and systems. 4. Explain and how to mathematically express entropy and its calculations.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lectures will deliver core content, providing students with the opportunity to acquire the information to enhance their knowledge and understanding of basic undergraduate-level physical chemistry. This will be complemented by tutorials to allow students to apply this learning to specific exemplar problems. A coursework assignment will provide students with an opportunity to apply the principles covered by this module and explore chosen areas of interest using a range of literature sources. Directed study will provide students with the opportunity to undertake guided reading and to develop their own portfolio of learning to enhance transferable skills and knowledge relating to evaluation of their own role and subject provision.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Units and dimensions
Week 2	Fundamental concepts
Week 3	1st law of Thermodynamics
Week 4	2nd Laws of Thermodynamics
Week 5	1st month exam
Week 6	Entropy

Week 7	Heat engines
Week 8	Gibbs Free Energy
Week 9	Clausius-Clapeyron equation
Week 10	2nd moth exam
Week 11	Chemical Equilibrium
Week 12	Chemical Reactions
Week 13	Rate of Reaction Equations.
Week 14	Phase Equilibria in Ideal Solutions
Week 15	Exame.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Viscosity
Week 2	Heat of solution
Week 3	Density
Week 4	Determination the surface tension of water
Week 5	Mathmatical applications on surface tension of water
Week 6	Determination of specific heat
Week 7	Capillary rise and wet
Week 8	Exam.
Week 9	Calorimeter constant part I
Week 10	Calorimeter constant part II
Week 11	Determination the reflective index
Week 12	Distillation
Week 13	Two component system
Week 14	Three component system

Week 15	Exam.
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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Physical Chemistry, Alberty.	Yes
Recommended Texts	Physical Chemistry, Atkins.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Chemical Eng. Principle III		Module Delivery	
Module Type	Core learning activity		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE 214			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGII	Semester of Delivery		3
Administering Department		College		
Module Leader	Dr. Ahmed Hasan Ali		e-mail	dr.ahmedha@mu.edu.iq
Module Leader's Acad. Title	Prof.		Module Leader's Qualification	Ph.D.
Module Tutor			e-mail	
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date			Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CHE123	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The module aims to teach students the basics of balancing matter and energy, basic mathematical operations in chemical engineering, and train them to develop their ability to solve problems in practice.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	5- In the successful complete of this module the students would be able to : 6- Know the conception of units , operating with units , dimensions , mole , density, concentration and pressure and to do their calculation. 7- Do materials and energy balance for processes. 8- Understand the conception of ideal gas and real gas and to do related calculations.
Indicative Contents المحتويات الإرشادية	Ideal gas Real gas s:Compressibility Real gases: Equations of state Single-component Two-phase systems (vapor pressure) Energy: terminology, Concepts, and units Introduction to Energy balances For processes Without reaction Calculation of Enthalpy changes Applications of Energy balance In the absence of chemical reactions

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Class learning Tutorial of problems solving. Self-study. Tests. Workshops.

Student Workload (SWL) الحمل الدراسي للطلاب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	88	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	6
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% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المناهج الاسبوعي النظري	
	Material Covered
Week 1	Gases
Week 2	Vapors
Week 3	Liquids and Solids.
Week 4	Ideal Gas.
Week 5	Ideal Gas.
Week 6	Mixture of Ideal Gases.
Week 7	Mixture of Ideal Gases.
Week 8	Vapor Pressure
Week 9	Mixture of Gas.
Week 10	Examination
Week 11	Saturated Vapor.
Week 12	Partial Saturation And Humidity.
Week 13	Energy Balance.
Week 14	Calculation of Thermal Content.
Week 15	Examination
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Basic principles and calculations in chemical engineering	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Engineering Statistics	Module Delivery
Module Type	Basic	☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	ENG215	
ECTS Credits	4	
SWL (hr/sem)	100	

Module Level	UGII	Semester of Delivery	3
Administering Department	Chemical	College	Engineering
Module Leader	Zahraa Abbas Khudhair	e-mail	Zahraa.abbas@mu.edu.iq
Module Leader's Acad. Title	Teacher Assistant	Module Leader's Qualification	Ms.c.
Module Tutor	--	e-mail	E-mail
Peer Reviewer Name		e-mail	E-mail
Scientific Committee Approval Date	15/06/2023	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Definition of the basic concepts in statistics. 2. Knowledge of the tools and methods used in the descriptive statistics represented in the collecting data methods , the questionnaire , tabular and graphical presentation of data. 3. The ability to make the necessary calculations to arrive at the various metrics that highlight the basic characteristics of the phenomenon, such as measures of central tendency, as well as measures of dispersion. 4. Understand the ideas of probability and the basic probability distributions including discrete and continuous, simple regression and coloration – time series(general trend equation) – index number

	5. Using appropriate statistical package (such as SPSS, Excel) to fit mathematical models
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Identify and understand the fundamental concepts in statistics 2- Familiarity with data scheduling and central trend calculators. 3- Gain an understanding of how to calculate the mean, median, and mode. 4- identify and understand the significance of probability and comprehend the different ways of calculations. 5- Increase the student's ability to derive probabilities from normal distribution tables. 6- recognize how to manipulate variables and find linear regressions or correlation's equations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Description and Classification of Data[5 hr] Frequency Distribution (Cumulative Frequency Distribution, Frequency Histogram, Frequency Polygon, Frequency Curve and Relative Frequency)[15 hr] Measurements of Central Tendency (Mathematical Mean, Mode, Geometric Mean and Harmonic Mean) [15hr]. Measures of Dispersion (Standard Deviation, Variance, Coefficient of Variance, Range and Mean Absolute Deviation)[15 hr] Theory of Probability, [15 hr] Permutation and Combination,[10 hr] Statistical Probability Distributions (Poisson, Binomial and Normal) [15 hr] , Sampling and Testing of Significant Chi-Square Distribution and Linear Correlation and regression.[10 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is as following: 1- Teaching through the pattern, whether it is the visual (verbal) pattern or the sensory (kinetic) pattern.

	2- Education using mini-lessons, where the scientific curriculum is divided into main ideas and then taught to the student in the form of successive lectures, and each lecture deals with only one idea.. 3- Cooperative learning where the students are divided into small groups and a specific issue is presented to them and students are given the opportunity to solve this issue in cooperation with each other. ٤- Adopting the method of delivering lectures and linking each topic with examples from the reality of the statistician's work ٥- practical exercises that are discussed by the students and solved during the lecture and with the participation of all students in the division with the professor to give the subject a kind of interaction.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	53	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	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	10% (30)	5, 11	LO #1, 2, ٤
	Assignments	2	10% (10)	3,10	LO # 2,3, 4, 5
	Projects / Lab.	-	-	-	
	Report	-	-	-	
Midterm Exam		2 hr	10% (10)	7	LO # 1-٥

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Description and Classification of Data
Week 2	Frequency Distribution & Cumulative Frequency Distribution
Week 3	Frequency Histogram, Frequency Polygon & Frequency Curve and Relative Frequency,
Week 4	
Week 5	Measurements of Central Tendency (Mathematical Mean, Mode, Geometric Mean and Harmonic Mean)
Week 6	
Week 7	Measures of Dispersion (Standard Deviation, Variance, Coefficient of Variance, Range and Mean Absolute Deviation)
Week 8	
Week 9	Theory of Probability
Week 10	
Week 11	Permutation and Combination
Week 12	Statistical Probability Distributions
Week 13	(Poisson Distribution, Binomial and Normal Distribution)
Week 14	Sampling and Testing of Significant
Week 15	Chi-Square Distribution and Linear Correlation and regression.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي المختبر	
	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	الاحتماليات والاحصاء . مترجم . د. موري شبيجل . د. جون شيلر . ٢٠٠٣	Yes
Recommended Texts	Probability , Statistics And Decision For Civil Engineers Statistics for Engineers, An introduction by S.J.Morrison	No
Websites	https://engineering.mu.edu.iq Class Room / https://classroom.google.com/c/NjAzMjExMzk0MzM4?cjc=ucqzmw2	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Pollution		Module Delivery
Module Type	Suport or related learning activity		☒ Theory ☒ Lecture Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE216		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGII	Semester of Delivery	
Administering Department	Chemical engineering	College	Engineering
Module Leader	Ali Salih Jafer	e-mail	Ali.salih@mu.edu.iq
Module Leader's Acad. Title	Lecturer	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	12/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: 1- Understand the concept of environment and the eco system 2- Learn about the atmosphere, its layers and components, and their impact on the Earth 3- Learn about air pollutants and how to treat them 4- Learn about water pollution and water treatment methods 5- Learn about renewable energy sources, their advantages and disadvantages
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	(a) Understand the environment and pollution . (b) Understand the greenhouses and climate change and global warming (c) Explain the acid rain (d) Understand the air pollution (e) Explain the air purifications (f) Explain water pollution (g) Understand the water treatment (h) Understand the renewable energy
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Definition of pollution, environmental pollutants, sources of pollution, types of pollution, the ecosystem, the impact of climate on the environment, and the effect of acid rain. air pollution Learn about air pollution, its types, pollutants, dry and wet treatment methods, and other methods Water Pollution Learn about water pollution, types of pollutants, and methods of water treatment Alternative Energy Learn about alternative energy, its types, and the benefits and disadvantages of each one
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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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.6
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	20% (20)	5, 10	LO 1-7
	Assignments	2	10% (10)	2, 12	LO 1-7
	Projects / Lab.				
	Report	1	10% (10)	13	LO 1-7
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction of Environment pollution
Week 2	Types of pollution
Week 3	Climate change and greenhouse effect
Week 4	Acid rain
Week 5	Air pollution
Week 6	Dry collection
Week 7	First monthly exam
Week 8	Wet Collection scrubbers
Week 9	The fabric filter and EPA
Week 10	Water pollution
Week 11	Water treatment
Week 12	Renewable energy
Week 13	Hydroelectricity + wind power
Week 14	Solar energy
Week 15	Second monthly exam

Week 16	Preparatory week before the final Exam
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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Environmental Pollution - S.M. Shafi	No
Recommended Texts	4th Edition The Science of Environmental Pollution	No

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Mathematics II		Module Delivery
Module Type	Basic learning activities		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 221		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGII	Semester of Delivery	4
Administering Department		College	
Module Leader	Dr. Rafea Dakhil Hussein	e-mail	rafea.dakhil@mu.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		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CHE211	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	The course will cover the materials: Polar coordinates and Graphs, calculating area and line in polar coordinates, double and triple integrals, vectors, partial derivatives, series, sequences, differential equations, first and second order differential equations and D-operator.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain mathematical ideas from multiple perspectives • Explain fundamental mathematical concepts or analyses of real-world problems to non-mathematicians and their applications.
Indicative Contents المحتويات الإرشادية	Overview of Polar coordinates Vectors Partial Derivatives Sequences and Series First and second – order differential equations Multiple integrals

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Group assignments in the classroom, the students will practice solving some questions; Homework, the students will practice solving questions on his/her own. Pop quizzes will cover the material previously discussed in class. The monthly arranged exam will cover specific topics from the lectures. The final exam will cover all materials which were discussed in class.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Sequences
Week 2	Series, Geometric series
Week 3	Combining series, the integral test, comparison tests

Week 4	Differential equations
Week 5	First order D.E., Separable D.E.
Week 6	Homogeneous D.E.
Week 7	Exact D.E.
Week 8	Linear D.E.
Week 9	Bernoulli D.E.
Week 10	Second – order Differential Equations
Week 11	Initial value and Boundary value problems
Week 12	Nonhomogeneous Linear Differential Equations
Week 13	Solving nonhomogeneous D.E by the Method of undetermined coefficient
Week 14	Solving nonhomogeneous D.E by the Method of Variation of Parameters
Week 15	Higher order differential equations (D operator)
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	• Thomas' Calculus, Thirteenth Edition George B Thomas, Massachusetts Institute of Technology - 2013. • James Stewart, Calculus, Early Transcendentals, 7th edition Brooks Cole (2012)	Yes
Recommended Texts	• Gilbert Strang, Edwin Herman, Calculus Volume 1 by OpenStax (2016)	Yes
Websites	www.openstax.org/details/calculus-volume-1	

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Fluid Flow II		Module Delivery		
Module Type	Core learning activity		☐ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	CHE 222				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGII	Semester of Delivery		4
Administering Department			College		
Module Leader	Dr. Raid Tariq Hade Alkhateeb		e-mail	dr.raidt@mu.edu.iq	
Module Leader's Acad. Title		Prof.	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		

Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CHE212	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	(a) Explain the basic Concepts of the general energy equation. (b) Explain the basic Concepts of fluid flow in pipes. (c) Explain the basic Concepts of piping networks. (d) Explain the basic Concepts of turbomachinery. (e) Explain the basic Concepts of Pump Performance. (f) Explain the basic Concepts of turbines. (m) Solve problems involving general energy equation, fluid flow in pipes, piping networks, turbomachinery, Pump Performance and turbines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Preparing chemical engineer, that of being able to take a fundamental understanding of the physical universe and apply it to solve practical problems in a way that is both effective and elegant. 2- Developing their ability to understand the behavior of fluid under various forces and at different atmospheric conditions, and to select the proper fluid for various application. 3- Builds their critical thinking skills by emphasizing the thought processes that lead to model development. 4- Developing their ability to understanding of the assumptions and limitations

	of the theories used in fluid flow. 5- Demonstrate their ability to conduct applied research and collect informational resources including data and evaluate these resources to solve practical problems in fluid flow.
Indicative Contents المحتويات الإرشادية	Overview of fluid flow physical properties of fluid and dimensional analysis Pressure and fluid statics Bernoulli's equation and Energy equations Fluid kinematics and Piping Networks Turbomachinery

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	2. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 3. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first.

	Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 4. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5
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	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to fluid in Pipes
Week 2	The Entrance Region
Week 3	Streamline and turbulent flow in Packed column.
Week 4	Laminar Flow
Week 5	Turbulent Flow
Week 6	Energy Equation
Week 7	Minor Energy Loss
Week 8	Major Energy Loss
Week 9	Energy Transfer by Work
Week 10	Energy Analysis of study Flow
Week 11	Introduction to Turbomachinery
Week 12	Hydraulic Grade and Energy Line
Week 13	Pump Performance
Week 14	Vaper pressure and cavitation
Week 15	Pump in Series
Week 16	

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Hydrostatic Force on a Fully submerged plane surface
Week 2	Hydrostatic Force on a Fully submerged plane surface
Week 3	Energy Losses In Pipes
Week 4	Energy Losses In Pipes
Week 5	Flow over weirs (flow over a rectangular notch)
Week 6	Flow over weirs (flow over a rectangular notch)
Week 7	Flow over triangular wires
Week 8	Flow over triangular wires
Week 9	Discharge coefficient for rectangular notch
Week 10	Discharge coefficient for rectangular notch
Week 11	Determine the characteristics of open channel flow over a triangular (vee) notch
Week 12	Determine the characteristics of open channel flow over a triangular (vee) notch
Week 13	Determining the centre of gravity of the pontoon
Week 14	Determining the centre of gravity of the pontoon
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	-FLUID MECHANICS: FUNDAMENTALS AND APPLICATIONS by YUNUS A. ÇENGEL & JOHN M CIMBALA., McGraw-Hill Publisher, 2003, (1st Editions).	Yes
Recommended Texts	- Fundamentals of FLUID MECHANICS by BRUCE R. MUNSON & DONALD F. YOUNG., John Wiley & Sons, Inc., 2002, (4th Editions). - FLUID MECHANICS AND HYDRAULICS by Jack B. Evett & Cheng Liu, McGraw-Hill Publisher, 1989.	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
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Physical chemistry II		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 223		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGII	Semester of Delivery	4
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Anas Bdiwi Salman		e-mail: dr.anas.bdiwi@mu.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Asst.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	CHE213	Semester	3
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module will introduce students to undergraduate level physical chemistry. By the end of this module students should have developed an understanding of important physical chemistry concepts, and associated mathematical concepts, to enable them to understand states of matter, chemical thermodynamics, kinetics
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Understanding reversible reactions and its related calculations. - Understanding and calculation of equilibrium constant. - Understanding and mathematically expressing the chemical reaction kinetics. - Understanding the effect of temperature on the reaction rate constant. - Understanding and application of Clausius and Clausius-Clapeyron equations
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures will deliver core content, providing students with the opportunity to acquire the information to enhance their knowledge and understanding of basic undergraduate-level physical chemistry. This will be complemented by tutorials to allow students to apply this learning to specific exemplar problems. A coursework assignment will provide students with an opportunity to apply the principles covered by this module and explore chosen areas of interest using a range of literature sources. Directed study will provide students with the opportunity to undertake guided reading and to develop their own portfolio of learning to enhance transferable skills and knowledge relating to evaluation of their own role and subject provision.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material
Week 1	Phase Equilibria in non-Ideal Solutions.Covered
Week 2	Electrochemical Equilibrium.
Week 3	Surface Thermodynamics
Week 4	Experimental Gas Kinetics
Week 5	1st month exam

Week 6	Viscosity of Liquids.
Week 7	Electrical Conductance
Week 8	Mid exam
Week 9	Electrical units
Week 10	Faraday's law of electrolysis
Week 11	Specific and equivalent conductance
Week 12	Measurement of electrolytic
Week 13	conductance
Week 14	Electrolytes
Week 15	Strong and weak electrolytes
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المناهج الأسبوعي للمختبر	
	Material Covered
Week 1	Adsorption
Week 2	Desorption
Week 3	Determination of the thermodynamic functions
Week 4	Determination the molecular weight of the solutions
Week 5	Exam.
Week 6	Saponification of ethyl acetate with different concentrations
Week 7	The effect of the presence of the catalyst on the fragmentation rate of hydrogen peroxide
Week 8	A kinetic study of an acid catalyzed reaction
Week 9	Determination of the solubility of benzoic acid in water
Week 10	Exam.
Week 11	Heat of neutralization for a weak acid and a strong base
Week 12	Heat neutralization for a strong acid and a strong base
Week 13	Methyl acetate hydrolysis

Week 14	Heat of Reaction Measurement
Week 15	Seminars

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Physical Chemistry, Alberty.	Yes
Recommended Texts	Physical Chemistry, Atkins.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Computer Programming		Module Delivery	
Module Type	Support or related learning activity		☐ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UNI224			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGII	Semester of Delivery		4
Administering Department	Chemical	College	Engineering	
Module Leader	Dawood Zahi Khutar		e-mail	dawoodzahi@mu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer		Module Leader's Qualification	MS.C
Module Tutor	-		e-mail	-
Peer Reviewer Name	Scientific Committee		e-mail	-
Scientific Committee Approval Date		Version Number		

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	UNI115	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Learn the basics of programming 2. Understand how the program works 3. Learn about the structure of the program and its components 4. Know the important commands to deal with functions
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The learner can write, design and implement a program in Visual Basic or MATLAB, according to the required details
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Using Files Visual Basic controls (check box, radio button, list box) Visual Basic controls (menu, Open File Dialog, combo box) Visual Basic controls (Color Dialog, Print Form Component, Font Dialog Control) Math Functions Multiple Forms Introduction to Matlab Matlab Programming Environment Vectors & Vector Operations Matrix & Matrix Operations Matlab M-files Interpolation Function Discovery

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The study of the programming subject depends on interactive education, through discussion between the professor and the students, conducting quick and sudden
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	exams and direct questions, and focusing on the practical side on applying all the required programs.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.6
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	30% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
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 الأسبوعي النظري	
	Material Covered

Week 1	Using Files
Week 2	Visual Basic controls (check box, radio button, list box)
Week 3	Visual Basic controls (menu, Open File Dialog, combo box)
Week 4	Visual Basic controls (Color Dialog, Print Form Component, Font Dialog Control)
Week 5	Math Functions
Week 6	Multiple Forms
Week 7	Introduction to Matlab
Week 8	Matlab Programming Environment
Week 9	Vectors & Vector Operations
Week 10	Matrix & Matrix Operations
Week 11	Matlab M-files
Week 12	Interpolation
Week 13	Function Discovery
Week 14	Using Files
Week 15	Visual Basic controls (check box, radio button, list box)
Week 16	Visual Basic controls (menu, Open File Dialog, combo box)

Delivery Plan (Weekly Syllabus)		
المناهج الاسبوعي العملي		
	Material Covered	
Week 1	Introduction to programming	
Week 2	Visual Studio (installation + interface)	
Week 3	Tools and properties	
Week 4	Writing codes	
Week 5	Comments and events	
Week 6	the condition	
Week 7	loops	
Week 8	Exam1	
Week 9	Introduction to MATLAB	
Week 10	matrices	
Week 11	operations on matrices	
Week 12	the condition	
Week 13	loops	
Week 14	Function drawing (2D)	
Week 15	Exam2	
Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Comprehensive programming in Visual Basic language. 2- Matlab step by step	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
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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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Properties of materials		Module Delivery		
Module Type	Suport or related learning activity		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	CHE 225				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGII	Semester of Delivery		4

Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Ahmed Rajih Hassan Wetaify	e-mail	e-mail: ah.ra34@mu.edu.iq
Module Leader's Acad. Title	prof	Module Leader's Qualification	Prof .dr.
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		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	5. The module aims to provide students with an understanding of the role of statistical methodologies in economics through both the study of the theory of probability and statistics, and hands-on practice using Excel with a variety of data types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	10. 1. Construct charts and calculate appropriate descriptive statistics to summarise a data set 11. 2. Understand discrete and continuous random variable, their distributions and moments 12. 3. Solve a range of problems involving probability 13. 4. Understand covariance, correlation, conditional probabilities and conditional expectations

	14. 5. Conduct hypothesis tests and interpret their results 15. 6. Demonstrate the ability to utilise a software package (Excel and Stata) for a range of statistical applications
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This is an introductory module for 2nd year engineering students to the area of Statistics. The course will introduce It covers all sectors and users, and introduces modern and proven management principles in administering official statistics. The strategy used in this course is outcome base learning. It is to test achievement of learning outcomes and changing upon. including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	

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

Delivery Plan (Weekly Syllabus)		
المنهاج الاسبوعي النظري		
	Material Covered	
Week 1	Introduction	
Week 2	Classifications of Materials	
Week 3	property of metals	
Week 4	Crystal systems of Materials	
Week 5	Bonds in Materials and Properties	
Week 6	Aluminum Alloys, Copper Alloys and Iron Alloys	
Week 7	Phase Diagrams	
Week 8	Ceramics	
Week 9	Type of Ceramics (Oxide-Silicate-Carbide -Nitride – Glass Ceramics)	
Week 10	polymers , classification , properties	
Week 11	Type of Polymers	
Week 12	composite materials	
Week 13	Corrosion: Types	
Week 14	Corrosion cells	
Week 15	mechanical properties of materials	
Week 16	Preparatory week before the final Exam	
Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Text Books	no

	Arrow, M. (2017) Statistics for Economics, Accounting & Business Studies, 7th edition, Harlow: Pearson Education	
Recommended Texts	- Peck, R., Short, T. and Olsen, C. (2020), Introduction to Statistics and Data Analysis, 6th edition, Cengage Learning. ISBN: 978-1-337-79361-2	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	English Language II		Module Delivery
Module Type	Support		☐ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	UNI226		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGII	Semester of Delivery	4
Administering Department	Chemical	College	Engineering
Module Leader	Hayder Kamil Shanbara	e-mail	hayder.shanbara@mu.edu.iq
Module Leader's Acad. Title	Asst. Prof. Dr.	Module Leader's Qualification	PhD
Module Tutor	-	e-mail	-
Peer Reviewer Name	Scientific Committee	e-mail	-
Scientific Committee Approval Date		Version Number	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	UNI125	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Here are some common module aims that should be considered: 1. Language Proficiency Development: The aim is to enhance students' overall language proficiency in English. The module aims to help students build a solid foundation in grammar, vocabulary, and pronunciation. 2. Communication Skills: The aim is to develop students' ability to communicate effectively in various everyday situations and academic contexts. 3. Vocabulary Expansion: The aim is to expand students' vocabulary range. The module focuses on introducing and reinforcing new words, idioms, and expressions commonly used in spoken and written English. 4. Grammar Mastery: The aim is to reinforce and expand students' understanding of English grammar structures. The module aims to provide systematic grammar instruction, practice, and application in authentic contexts. 5. Independent Learning Skills: The aim is to develop students' ability to take responsibility for their own learning and become independent language learners. The module may include strategies and activities to foster self-directed learning, such as setting learning goals, self-assessment, and using online resources.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Grammar Competence: Develop grammatical accuracy and fluency by understanding and using a range of grammatical structures and tenses appropriately. Apply grammar rules in speaking and writing to convey meaning accurately. 2. Take responsibility for self-directed learning, utilizing various resources, such as dictionaries, online tools, and language-learning platforms. Reflect on learning progress, set goals, and employ effective study strategies to continue language development beyond the classroom. 3. Develop language skills required for academic and professional contexts.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Vocabulary Building: - Everyday vocabulary and expressions - Vocabulary related to various topics such as family, hobbies, work, travel, etc. - Vocabulary expansion through word families, synonyms, antonyms, and collocations

	2. Grammar: - Review and reinforcement of basic grammar structures (present tenses, past tenses, future tenses, etc.) - Grammar practice through contextualized examples and exercises 3. Reading Skills: - Reading and understanding short texts, articles, and stories - Developing reading comprehension skills through exercises and questions - Building reading speed and comprehension through practice 4. Writing Skills: - Developing writing skills through guided writing activities - Writing short paragraphs and essays on various topics - Practicing sentence structure, paragraph organization, and coherence 5. Listening and Speaking Integration: - Engaging in listening activities followed by discussion and oral responses - Participating in group discussions and presentations - Practicing listening and speaking skills in real-life situations
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Communicative Approach: Emphasize active communication in the target language by encouraging students to use English in real-life situations and provide ample opportunities for them to practice speaking and listening skills. 2. Task-Based Learning: Design tasks and activities that require students to use English to complete meaningful and purposeful tasks. 3. Differentiated Instruction: Cater to the diverse learning needs and preferences of students by employing varied instructional strategies. Provide a range of activities, materials, and assessments to accommodate different learning styles, abilities, and interests. 4. Use of Technology: Integrate technology tools and resources to enhance language learning. 5. Formative Assessment: Implement regular formative assessments such as quizzes, presentations, group projects, and class discussions to monitor student progress and provide timely feedback. Encourage self-assessment and reflection to promote learner autonomy.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.6
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	30% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
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 الأسبوعي النظري

	Material Covered
Week 1	Tenses • Questions • Using a bilingual dictionary • Social expressions 1
Week 2	Present tenses • have/have got • Collocation - daily life • Making conversation
Week 3	Past tenses • Word formation • Time expressions

Week 4	much/many · some/any • a few, a little, a lot of • Articles • Shopping • Prices
Week 5	Verb patterns 1 , Future forms , Hot verbs , How do you feel?
Week 6	What ... like? • Comparatives and superlatives • Synonyms and antonyms • Directions
Week 7	Mid-term Exam
Week 8	Present Perfect • for, since • Adverbs, word pairs • Short answers
Week 9	have (got) to · should/must. Words that go together • At the doctor's
Week 10	Time clauses • if • Hot verbs • In a hotel
Week 11	Verb patterns 2 , manage to, used to -ed/-ing adjectives • Exclamations
Week 12	Passives , Verbs and nouns that go together , Notices
Week 13	Second conditional • might • Phrasal verbs • Social expressions 2
Week 14	Present Perfect Continuous • Word formation • Adverbs • Telephoning
Week 15	Past Perfect • Reported statements • Saying goodbye
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New Headway Pre-Intermediate Student's Book, John and Liz Soars, Plus edition	Yes
Recommended Texts	A Self-study Grammar Book for Engineers, Sonia Oliver and Monica Soler	No
Websites	https://elt.oup.com/student/headway/preint4/?cc=us&selLanguage=en	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Engineering analysis	Module Delivery
Module Type	Basic learning activities	☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical
Module Code	CHE 311	
ECTS Credits	3	
SWL (hr/sem)	75	

		☐ Seminar	
Module Level	UGIII	Semester of Delivery	5
Administering Department		College	
Module Leader	Dr. Adil H. Rashid	e-mail	adil.hatem@mu.edu.iq
Module Leader's Acad. Title	Asst. Prof	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CHE221	Semester	4
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: (a) Understand the concept of Differential Equations. (b) Solution of First Order ODE. (c) Solution of Second Order ODE. (d) Solution of Higher Order ODE. (e) Solution of Simultaneous Differential Equations. (f) Solution of Partial Differential Equations – Method of Direct Integration. (g) Solution of Partial Differential Equations – Separation of Variables. (h) Solution of Partial Differential Equations – Combination of Variables.

	i) Solution of Partial Differential Equations – Laplace Transforms. j) Formulation of Chemical Engineering Problems. k) Special Functions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course the students will: 1. be able to apply knowledge of mathematics, science, and engineering. 2. Have the ability to identify, formulate, and solve engineering problems. 3. Construct rigorous mathematical arguments and proofs in engineering context. 4. Know how to use differentiation and integration in the context of engineering analysis and solving practical engineering problems. 5. Comprehend translations of common realistic engineering contexts into mathematics.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: ☐ Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. ☐ Due dates will be given in class. Late papers may be accepted but will be

	docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. □ Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	28	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	First Order Ordinary Differential Equations – Part One
Week 2	First Order Ordinary Differential Equations – Part Two
Week 3	Second Order Ordinary Differential Equations – Part One
Week 4	Second Order Ordinary Differential Equations – Part Two
Week 5	Second Order Ordinary Differential Equations – Part Three
Week 6	Higher Order Differential Equations – Part One
Week 7	Higher Order Differential Equations – Part Two
Week 8	Partial Differential Equations – Part One
Week 9	Partial Differential Equations – Part Two
Week 10	Partial Differential Equations – Part Three
Week 11	Partial Differential Equations – Part Four
Week 12	Simultaneous Differential Equations
Week 13	Special Functions – Part One
Week 14	Special Functions – Part Two
Week 15	Formulation of Chemical Engineering Problems – Part One
Week 16	Formulation of Chemical Engineering Problems – Part Two

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Erwin Kreyszig. Advanced-Engineering-Mathematics, 10th-edition, 2011.	Yes
Recommended Texts	1- Jenson V. G. and Jeffreys G. V. , " Mathematical Methods in Chemical Engineering " , International Edition, 2001. 2- Wylie C. R. and Barreth L. C., "Advanced Engineering Mathematics", Fifth Edition, 1982.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mass transfer I		Module Delivery
Module Type	Core learning activity		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 312		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	5
Administering Department		College	
Module Leader	Dr. Anas Bdiwi Salman	e-mail	dr.anas.bdiwi@mu.edu.iq
Module Leader's Acad. Title	Asst.Prof.	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		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	(a) Students will learn about the diffusional mass transfer. (b) Operation of cooling tower will be clearly understood. (c) Operation of Dryer will be understood. (d) Student will understand the mechanism of crystallization and absorption. (e) Students will come to know the design of a distillation column. (f) Design of adsorbed. (g) calculations involved in liquid-liquid extraction (h) calculations involved in solid liquid extraction
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- understanding the principles of diffusion 2- classification and mathematical representation of diffusion modes 3- understanding the mechanism of mass transfer by mass transfer theories 4- understanding the gas-liquid separation processes 5-Understanding the principles of solid-liquid extraction
Indicative Contents المحتويات الإرشادية	Diffusion Leaching Distillation Absorption Liquid-liquid extraction Evaporation

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor.
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	Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	88	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Diffusion
Week 2	Modes of diffusion
Week 3	Mass Transfer Theories
Week 4	Mass Transfer Coefficient
Week 5	1st month exam
Week 6	Absorption of Gases: introduction
Week 7	Minimum liquid flow rate
Week 8	Calculation of column height
Week 9	Extraction (Liquid-Liquid)
Week 10	2nd moth exam
Week 11	Equilibrium data for ternary systems
Week 12	Calculation of number of stages
Week 13	Leaching (solid – Liquid)
Week 14	Calculation of number of stages
Week 15	3rd moth exam

Week 16	
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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Chemical engineering volume 1 by Coulson and Richrdson (5th Editions). Chemical engineering volume 2by Coulson and Richrdson (5th Editions).	Yes
Recommended Texts	-Mass transfer operations by Treybal	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Heat transfer I		Module Delivery
Module Type	Core learning activity		☐ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 313		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	5
Administering Department		College	
Module Leader	Dr. Ghazi Faisal Naser	e-mail	ghazi_faisal@mu.edu.iq
Module Leader's Acad. Title	Asst. Prof	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		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

- a) Understand how thermodynamics and heat transfer are related to each other, and distinguish thermal energy from other forms of energy and heat transfer from other forms of energy transfer, and perform general energy balances as well as surface energy balances, and understand the basic mechanisms of heat transfer, which are conduction, convection, and radiation, and Fourier's law of heat conduction, Newton's law of cooling, and the Stefan– Boltzmann law of radiation.
- b) Identify the mechanisms of heat transfer that occur simultaneously in practice, and develop an awareness of the cost associated with heat losses, and solve various heat transfer problems encountered in practice.
- c) Understand multidimensionality and time dependence of heat transfer and the conditions under which a heat transfer problem can be approximated as being one-dimensional, and obtain the differential equation of heat conduction in various coordinate systems, and simplify it for the steady one-dimensional case, and identify the thermal conditions on surfaces, and express them mathematically as boundary and initial conditions.
- d) Solve one-dimensional heat conduction problems and obtain the temperature distributions within a medium and the heat flux, and analyze one-dimensional heat conduction in solids that involve heat generation, and evaluate heat conduction in solids with temperature dependent thermal conductivity.
- e) Understand the concept of thermal resistance and its limitations, and develop thermal resistance networks for practical heat conduction problems, and solve steady conduction problems that involve multilayer rectangular, cylindrical, or spherical geometries.
- f) Develop an intuitive understanding of thermal contact resistance and circumstances under which it may be significant, and identify applications in which insulation may actually increase heat transfer, and analyze finned surfaces, and assess how efficiently and effectively fins enhance heat transfer, and solve multidimensional practical heat conduction problems using conduction shape factors.
- g) Assess when the spatial variation of temperature is negligible and temperature varies nearly uniformly with time, making the simplified lumped system analysis applicable, and obtain analytical solutions for transient one-dimensional conduction problems in rectangular, cylindrical, and spherical geometries using the method of separation of variables, and understand why a one-term solution is usually a reasonable approximation.

	h) Understand the physical mechanism of convection and its classification, and visualize the development of velocity and thermal boundary layers during flow over surfaces. i) Gain a working knowledge of the dimensionless Reynolds, Prandtl, and Nusselt numbers, and distinguish between laminar and turbulent flows, and gain an understanding of the mechanisms of momentum and heat transfer in turbulent flow. j) Recognize empirical relations for pipe and tube flow and empirical correlation heat transfer for fully developed turbulent flow in Tubes, and empirical relation for laminar heat transfer in tubes. k) Recognize numerous types of heat exchangers, and classify them, and develop an awareness of fouling on surfaces, and determine the overall heat transfer coefficient for a heat exchanger, and perform a general energy analysis on heat exchangers. l) Obtain a relation for the logarithmic mean temperature difference for use in the LMTD method, and modify it for different types of heat exchangers using the correction factor, and develop relations for effectiveness, and analyze heat exchangers when outlet temperatures are not known using the effectiveness-NTU method, and know the primary considerations in the selection of heat exchangers. m) Classify electromagnetic radiation, and identify thermal radiation, and understand the idealized blackbody, and calculate the total and spectral blackbody emissive power, and calculate the fraction of radiation emitted in a specified wavelength band using the blackbody radiation functions. n) Understand the concept of radiation intensity, and define spectral directional quantities using intensity, and develop a clear understanding of the properties emissivity, absorptivity, reflectivity, and transmissivity on spectral, directional, and total basis, and apply Kirchhoff's law to determine the absorptivity of a surface when its emissivity is known.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Per the Department's program assessment outcomes, by the end of this course you should demonstrate the following relevant to Heat Transfer: 1) an ability to apply knowledge of mathematics, principles of chemical engineering, and thermodynamics, 2) an ability to conduct the main concepts of heat transfer, 3) the ability to develop an awareness of the cost associated with heat losses, 4) Analyze finned surfaces, and assess how efficiently and effectively fins enhance heat transfer.
Indicative Contents المحتويات الإرشادية	Introduction and Basic Concepts Heat Conduction Equation Steady Heat Conduction Transient Heat Conduction Fundamentals Of Convection Heat Exchangers

	Fundamentals of Thermal Radiation
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Strategies can be classified in to: Lectures, Reports, Seminars, Group Assignment, Quizzes and Final Exam, where Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية				
	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Supplemental examples
Week 3	Types of Heat Transfer
Week 4	Supplemental examples
Week 5	Heat conductance
Week 6	Supplemental problems
Week 7	One dimensional steady state conduction
Week 8	Supplemental examples
Week 9	Radial systems (Cylinder and sphere)
Week 10	Supplemental examples
Week 11	Thermal resistors
Week 12	Overall heat transfer coefficient
Week 13	Critical thickness of insulator
Week 14	Heat generation (Heat source)
Week 15	Fins
Week 16	

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Steady State Conduction through a Uniform Plane Wall
Week 2	Steady State Conduction through a Uniform Plane Wall
Week 3	Use of the Fourier Rate Equation of Linear Heat Conduction
Week 4	Use of the Fourier Rate Equation of Linear Heat Conduction
Week 5	Overall Heat Transfer Coefficient for Differing Materials in Series
Week 6	Overall Heat Transfer Coefficient for Differing Materials in Series
Week 7	Determination of Thermal Conductivity (Constant of Proportionality)
Week 8	Determination of Thermal Conductivity (Constant of Proportionality)
Week 9	Relationship of Temperature Gradient to Cross-Sectional Area
Week 10	Relationship of Temperature Gradient to Cross-Sectional Area
Week 11	Effect of Contact Resistance on Thermal Conduction
Week 12	Effect of Contact Resistance on Thermal Conduction
Week 13	Application and Thermal Conductivity of Insulators
Week 14	Application and Thermal Conductivity of Insulators
Week 15	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Holman, J.P., Heat Transfer, Tenth Edition, McGraw-Hill (2010).& Yunus, A. C., Heat and Mass Transfer, 6th. Edition (2020).	Yes
Recommended Texts	-FRANK P. INCROPERA / DAVID P. DEWITT / THEODORE L. BERGMAN / ADRIENNE S. LAVINE, Fundamentals of Heat and Mass Transfer, SIXTH EDITION (2007). -Cao, E., Heat transfer in process engineering, McGraw-Hill. - Serth, R.W., Process Heat Transfer, Principles and Applications, Elsevier.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Industrial Management		Module Delivery
Module Type	Support or related learning activity		☐ Theory ☒ Lecture Lab Tutorial ☐ Practical ☐ Seminar
Module Code	CHE314		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGIII	Semester of Delivery	5
Administering Department		College	
Module Leader	HAIDER TAWFIQ NAEEM	e-mail	haidertn@mu.edu.iq
Module Leader's Acad. Title	Asst. Prof	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	

Scientific Committee Approval Date		Version Number	1.0
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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	- Conveying the whole facts to students of how the facility is planned, established, and properly distributed to work sites and equipment, starting with raw materials and ending with distributing the product to the consumer. - Learn the general principles and the definitions, basics and purpose of engineering examination and quality control and its purpose for all engineering and other materials that especial in industrial facilities.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- To make the student understand the basics of engineering management due to its importance in industrial facilities - Learn the methods and art of solving problems that a chemical engineer faces during work - Mastering good work planning, including qualitative distribution of equipment and work - Teaching the principles of controlling facilities through linear programming that includes different methods - Preparing a chemical engineer capable of analyzing charts and schedules to work in industrial facilities - Considering and understanding the engineering economics of the

	project or facility 7. Consider achieving the highest profits in exchange for the lowest costs and good management of the industrial facility 8. The ability to address existing problems and take the appropriate decision Organizing and distributing tasks among the work items in the industrial establishment
Indicative Contents المحتويات الإرشادية	Introduction Standard form Big M technique Introduction to Production Operation Management. Plant Location & Layout. Material Handling Material Management. Quality Control. Work Study: Time Motion Study. Maintenance Management

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Giving weekly lectures • Using mathematical problems in the classroom • Questions and discussion in the classroom • Giving the student various sources and books to benefit from them widely • Teaching the student the methods of scientific research through traditional writing or on the Internet • Giving focused and distinct questions • Using educational charts as illustrations Classroom and extracurricular assignments

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Standard form

Week 3	Big M technique
Week 4	Introduction to Production
Week 5	Operation Management.
Week 6	Plant Location & Layout.
Week 7	Material Handling
Week 8	Material Management.
Week 9	Quality Control.
Week 10	Work Study: Time
Week 11	Motion Study.
Week 12	Maintenance Management
Week 13	Cost handling
Week 14	Environmental processing
Week 15	projects technique
Week 16	Production management

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Industrial Engineering & Management , Jacobs University Undergraduate Handbook IEM - Matriculation Fall 2015 2- Production and Operation Management, S. A. KUMAR, N. SURASH, Second Edition, 2008, 2006 New Age International (P) Ltd., Publishers.	Yes
Recommended Texts	1- -Engineering Economy, Leland Blank, A. Traquin, SEVENTH EDITION, 2012 McGraw-Hill, USA. 2- Engineering Economics, John M. Watts, Jr., and Robert E. Chapman. 3- Foundations of Engineering Economy, Online highereducation.com/sites/dl/free/.../bla76353_ch01.pdf .	No

	4- Fundamental of Industrial Engineering, Online 5- Reliability and Maintainability in Operations Management, Filippo De Carlo, http://www.intechopen.com/ 6- Engineering Optimization Theory and Practice, Singiresu S. Rao, Fourth Edition, 2009 by John Wiley & Sons OPERATIONS RESEARCH, S.R. Yadav, A.K. Malik, First published in 2014, Oxford University Press	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Reactor design I		Module Delivery
Module Type	Core learning activity		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 315		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	5
Administering Department		College	
Module Leader	Dr. Forat Yasir Sharrad	e-mail	furatyasir@mu.edu.iq
Module Leader's Acad. Title	Asst. Prof	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		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	(a) Understand the concept of chemical reaction engineering. (b) Understand the chemical reaction engineering throughout the chemical reactors. (c) Explain the purpose of estimating the performance requirements, such as the yield, selectivity, limiting and excess reactants. (d) Understand the kinetics of homogeneous and heterogeneous reactors. (e) Explain the differences between the elementary and non-elementary reactions. (f) Explain the differences between the concentration and temperature dependent terms of the rate equations. (g) Understand the concepts of Thermodynamics of the chemical reactions. (h) Conduct the rate constant and the order of the chemical reaction. (i) Understand the types of the chemical reactions and their effects on the rate of reaction equation form. (j) Explain the concepts of the homogeneous catalyzed reactions. (k) Understand the gaseous reactions throughout the chemical reactors. (l) Explain the basic Concepts of choosing the appropriate reactor type based on the nature of the chemical reaction. (m) Solve problems involving yield, selectivity, limiting and excess reactants, reactions orders, the rate constant, activation energy, and methods of half-life subject as well as the thermodynamics parameters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Preparing qualified engineers in the field of chemical reactor design to keep pace with contemporary developments and meet the requirements of the country's scientific and economic development plans 2- Improve their skills in analysis, design, operation and use of modern laboratory equipment and software to design several types of reactors. 3- Improve their ability to communicate verbally with scientific societies to visualize and explain work in a more sophisticated way, as well as developing their ability to conduct applied research that can contribute in serving the community.
Indicative Contents	Overview of Chemical Reaction Engineering

المحتويات الإرشادية	Concentration and temperature dependent terms of a rate equation Kinetics of homogeneous reactors Thermodynamics of chemical reactions First and second order reversible reactions Gaseous Reactions
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	88	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Overview of Chemical Reaction Engineering
Week 2	Chemical kinetics
Week 3	Yield, selectivity, limiting and excess reactants
Week 4	Kinetics of homogeneous reactors

Week 5	Concentration-dependent term of a rate equation
Week 6	Elementary and non-elementary reactions
Week 7	Temperature-dependent term of a rate equation
Week 8	Thermodynamics of chemical reactions
Week 9	Equilibrium rate constant
Week 10	Reaction orders
Week 11	Method of half-life
Week 12	First and second order reversible reactions
Week 13	Homogeneous Catalyzed Reactions
Week 14	Gaseous Reactions
Week 15	Basic Concepts in Reactor Design and Ideal Reactor Models
Week 16	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Chemical Reaction Engineering by Levenspiel, Octave, John Wiley & Sons, 1999, (3rd Editions).	Yes
Recommended Texts	- Chemical Reactor Design by Harriott, Peter, Marcel Dekker Publisher, 2003, (1st Editions). - Elements of Chemical Reaction Engineering by Fogler, H. Scott, Prentice -Hall, 2004, (4th Editions).	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Thermodynamic I		Module Delivery
Module Type	Core learning activity		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 316		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	5
Administering Department		College	
Module Leader	Dr. Hameed Rasheed ALamery	e-mail	hameed_hrd@mu.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		Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		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	(a) Understand the of introduction and basic concepts of thermodynamics. (b) Improve the efficiency of a process for the transformation between energy and work. (c) To study energy conversion in different forms. To study the entropy of a system. (d) To study of the relationship between properties of heat, temperature, energy, and work (e) Understand to the relationship between the laws of thermodynamics and the concepts of entropy and the Internal Energy Formula. (f) Study thermodynamics gives the basic concepts for heat engines, power plants, chemical reactions, refrigerators etc... (g) Use the thermodynamic rules to simulate energy, work, and heat exchanges. (h) Explained Mass and energy balances for open and closed systems. (i) Understand the applications of thermodynamics to flow processes such as turbine, compressors, pumps. (j) Application the thermodynamic equations to calculate the flow (both subsonic and supersonic) in pipes and nozzles. (k) Explain the concept of heat effects of industrial reactions and solve these problems.

	(l) Explain the basic Concepts of Refrigeration and Liquefaction and it applications. (m) Understand the explain the basic concepts of Carnot engine with ideal-gas-state working fluid and it applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Explain fundamental thermodynamic properties. Describe basic concepts of Thermodynamics. 2- Calculate absolute and gage pressure, and absolute temperature. 3- Calculate changes in kinetic, potential, enthalpy and internal energy. 4- Definitions of system, surrounding, closed and open system, extensive and intensive properties. 5- Derive and discuss the first and second laws of thermodynamics.
Indicative Contents المحتويات الإرشادية	Introduction and basic concepts of thermodynamics First law of thermodynamics Volumetric Properties of Pure Fluids Steam table heat effects of industrial reactions The Second Law of Thermodynamics

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following

	class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	88	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Basic Concepts of Thermodynamics.
Week 2	Pressure ,The Specific Volume, Temperature.
Week 3	Energy, Work And Heat Kinetic And Potential Energy
Week 4	Thermodynamic Systems
Week 5	The First Law and Other Basic Concepts
Week 6	Closed-System Reversible Processes; Enthalpy and open system (flow - system).
Week 7	Exam.1
Week 8	Two-Phase Liquid / Vapor Systems And Thermodynamic Diagrams (Steam Table).
Week 9	Volumetric Properties of Pure Fluids
Week 10	Ideal Gas and Ideal-Gas State
Week 11	Application Of The Virial Equations and Cubic Equations of State
Week 12	Exam 2
Week 13	Temperature Dependence Of ΔH° .
Week 14	Heat Effects Of Industrial Reactions.
Week 15	The Second Law Of Thermodynamics.
Week 16	

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

Required Texts	J. M. Smith; Et.Al., Introduction To Chemical Engineering Thermodynamics, Eighth Edition, Published By McGraw-Hill Education, Copyright © 2018	Yes
Recommended Texts	- Thermodynamics: An Engineering Approach 8th Edition Yunus A. Cengel, Michael A. Boles McGraw-Hill, 2015. - Y. A. Çengel and M. A. Boles, Thermodynamics: An Engineering Approach, 5th Edition McGraw-Hill, 2006.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Numerical methods		Module Delivery
Module Type	Basic learning activities		☐ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 321		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGIII	Semester of Delivery	6
Administering Department		College	
Module Leader	Dr. Adil H. Rashid	e-mail	adil.hatem@mu.edu.iq
Module Leader's Acad. Title	Asst. Prof	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CHE311	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: (a) Understand the Concept of Numerical Methods. (b) Solution Of Non-Linear Equations. (c) Solution Of Simultaneous Linear Equations. (d) Curves Fitting. (e) Interpolation. (f) Numerical Differentiation. (g) Numerical Integration
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems. 2. Apply numerical methods to obtain approximate solutions to mathematical problems. 3. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. 4. Analyze and evaluate the accuracy of common numerical methods. 5. Implement numerical methods in Matlab. 6. Write efficient, well-documented Matlab code and present numerical results in an informative way.
Indicative Contents المحتويات الإرشادية	Solution of non- linear Equations-Simple Iterative Method. Solution of non- linear Equations- Newton- Raphson Method. Solution Of Simultaneous Linear Equations- Direct Methods. Solution Of Simultaneous Linear Equations- Indirect Methods.

	Curves Fitting. Interpolation Numerical Integration and Differentiation.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: ☐ Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. ☐ Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. ☐ Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each

	exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Solution of Non Linear Equations: Simple Iteration Method

Week 2	Solution of Non Linear Equations: Newton- Raphson Method
Week 3	Solution of Simultaneous Equations: Direct Method
Week 4	Solution of Simultaneous Equations: Indirect Method
Week 5	Curves Fitting – Part One
Week 6	Curves Fitting – Part Two
Week 7	Class Review and First Month Exam
Week 8	Numerical Interpolation – Part One
Week 9	Numerical Interpolation – Part Two
Week 10	Finite Differences Method & Forward, Backward, and Center Expressions
Week 11	Newton & Lagrange Forms
Week 12	Numerical Differentiation
Week 13	Numerical Integration
Week 14	Solution of Ordinary Differential Equation O.D.E
Week 15	
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Steven C. Chapra, Applied Numerical Methods with MATLAB® for Engineers and Scientists , Fourth Edition, 2018.	Yes
Recommended Texts	1- James F. Epperson, An Introduction To Numerical Methods and Analysis, Second Edition, 2013.	Yes

Delivery Plan (Weekly Syllabus)		
المنهاج الاسبوعي العملي		
	Material Covered	
Week 1	Introduction to MATLAB	
Week 2	Array transpose	
Week 3	plot	
Week 4	Solution of Non-linear equation by simple iteration method	
Week 5	Solution of Non-linear equation by simple iteration method	
Week 6	Solution of non-linear equation Newton Raphson Method	
Week 7	Solution of non-linear equation Newton Raphson Method	
Week 8	Solution of linear system of equation	
Week 9	Solution of linear system of equation	
Week 10	Interpolation	
Week 11	Interpolation	
Week 12	Function Discovery	
Week 13	Function Discovery	
Week 14	Integration	
Week 15	differentiation	
	2- Erwin Kreyszig. Advanced-Engineering-Mathematics, 10th-edition, 2011.	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Mass transfer II		Module Delivery	
Module Type	Core learning activity		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE 322			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGIII	Semester of Delivery		6
Administering Department		College		
Module Leader	Dr. Anas Bdiwi Salman		e-mail	dr.anas.bdiwi@mu.edu.iq
Module Leader's Acad. Title	Asst.Prof.		Module Leader's Qualification	Ph.D.
Module Tutor			e-mail	
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date			Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	CHE312	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	(a) Students will learn about the diffusional mass transfer. (b) Operation of cooling tower will be clearly understood. (c) Operation of Dryer will be understood. (d) Student will understand the mechanism of crystallization and absorption. (e) Students will come to know the design of a distillation column. (f) Design of adsorbed. (g) calculations involved in liquid-liquid extraction (h) calculations involved in solid liquid extraction
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- understanding the principles of liquid-liquid extraction 2- understanding the ternary system equilibrium data 3- understanding the equilibrium data of distillation 3- understanding the mathematical expression of distillation kinds 4- understanding the principles of humidification 5- understanding the principles of crystalization
Indicative Contents المحتويات الإرشادية	Diffusion Leaching Distillation Absorption Liquid-liquid extraction

	Evaporation
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	62	Structured SWL (h/w)	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Distillation: Introduction
Week 2	Simple distillation
Week 3	Flash distillation
Week 4	Continuous distillation: binary system
Week 5	1st month exam
Week 6	Multi-component Distillation
Week 7	Humidification
Week 8	Cooling Towers
Week 9	Drying

Week 10	2nd moth exam
Week 11	Steps of Drying
Week 12	Evaporation: Types of Evaporation
Week 13	Single effect evaporators
Week 14	Multiple Effects evaporators
Week 15	3rd moth exam
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Chemical engineering volume 1 by Coulson and Richrdson (5th Editions). Chemical engineering volume 2by Coulson and Richrdson (5th Editions).	Yes
Recommended Texts	-Mass transfer operations by Treybal	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Heat transfer II		Module Delivery
Module Type	Core learning activity		☐ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 323		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level		UGIII	
Administering Department			College
Module Leader	Dr. Ghazi Faisal Naser		e-mail
Module Leader's Acad. Title		Asst. Prof	Module Leader's Qualification
Module Tutor			e-mail
Peer Reviewer Name			e-mail
Scientific Committee Approval Date			Version Number
			1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	CHE313	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	a) Understand how thermodynamics and heat transfer are related to each other, and distinguish thermal energy from other forms of energy and heat transfer from other forms of energy transfer, and perform general energy balances as well as surface energy balances, and understand the basic mechanisms of heat transfer, which are conduction, convection, and radiation, and Fourier's law of heat conduction, Newton's law of cooling, and the Stefan– Boltzmann law of radiation. b) Identify the mechanisms of heat transfer that occur simultaneously in practice, and develop an awareness of the cost associated with heat losses, and solve various heat transfer problems encountered in practice. c) Understand multidimensionality and time dependence of heat transfer and the conditions under which a heat transfer problem can be approximated as being one-dimensional, and obtain the differential equation of heat conduction in various coordinate systems, and simplify it for the steady one-dimensional case, and identify the thermal conditions on surfaces, and express them mathematically as boundary and initial conditions. d) Solve one-dimensional heat conduction problems and obtain the temperature distributions within a medium and the heat flux, and analyze one-dimensional heat conduction in solids that involve heat generation, and evaluate heat conduction in solids with temperature dependent thermal conductivity. e) Understand the concept of thermal resistance and its limitations, and develop thermal resistance networks for practical heat conduction problems, and solve steady conduction problems that involve multilayer rectangular, cylindrical, or spherical geometries. f) Develop an intuitive understanding of thermal contact resistance and circumstances under which it may be significant, and identify applications in which insulation may actually increase heat transfer, and analyze finned surfaces, and assess how efficiently and effectively fins enhance heat transfer, and solve
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	multidimensional practical heat conduction problems using conduction shape factors. g) Assess when the spatial variation of temperature is negligible and temperature varies nearly uniformly with time, making the simplified lumped system analysis applicable, and obtain analytical solutions for transient one-dimensional conduction problems in rectangular, cylindrical, and spherical geometries using the method of separation of variables, and understand why a one-term solution is usually a reasonable approximation. h) Understand the physical mechanism of convection and its classification, and visualize the development of velocity and thermal boundary layers during flow over surfaces. i) Gain a working knowledge of the dimensionless Reynolds, Prandtl, and Nusselt numbers, and distinguish between laminar and turbulent flows, and gain an understanding of the mechanisms of momentum and heat transfer in turbulent flow. j) Recognize empirical relations for pipe and tube flow and empirical correlation heat transfer for fully developed turbulent flow in Tubes, and empirical relation for laminar heat transfer in tubes. k) Recognize numerous types of heat exchangers, and classify them, and develop an awareness of fouling on surfaces, and determine the overall heat transfer coefficient for a heat exchanger, and perform a general energy analysis on heat exchangers. l) Obtain a relation for the logarithmic mean temperature difference for use in the LMTD method, and modify it for different types of heat exchangers using the correction factor, and develop relations for effectiveness, and analyze heat exchangers when outlet temperatures are not known using the effectiveness-NTU method, and know the primary considerations in the selection of heat exchangers. m) Classify electromagnetic radiation, and identify thermal radiation, and understand the idealized blackbody, and calculate the total and spectral blackbody emissive power, and calculate the fraction of radiation emitted in a specified wavelength band using the blackbody radiation functions. n) Understand the concept of radiation intensity, and define spectral directional quantities using intensity, and develop a clear understanding of the properties emissivity, absorptivity, reflectivity, and transmissivity on spectral, directional, and total basis, and apply Kirchhoff's law to determine the absorptivity of a surface when its emissivity is known.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course you should demonstrate the following relevant to Heat Transfer: 1) Design in details an important unit such as heat exchanger 2) an understanding of professional and ethical responsibility, 3) an ability to communicate effectively, 4) an education necessary to understand the impact of engineering solution in a global, economic, environmental, and societal context, and 5) an ability to use the techniques, skills, and modern engineering tools necessary for

	engineering practice.
Indicative Contents المحتويات الإرشادية	Introduction and Basic Concepts Heat Conduction Equation Steady Heat Conduction Transient Heat Conduction Fundamentals Of Convection Heat Exchangers Fundamentals of Thermal Radiation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Strategies can be classified in to: Lectures, Reports, Seminars, Group Assignment, Quizzes and Final Exam, where Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Unsteady state conduction
Week 2	Supplemental examples
Week 3	Thermal boundary layer for laminar and turbulent flow
Week 4	Supplemental examples
Week 5	Analogy between fluid friction& heat transfer
Week 6	Supplemental examples
Week 7	Heat Exchangers (part I)
Week 8	Supplemental examples
Week 9	Heat Exchangers (part II)
Week 10	Supplemental examples
Week 11	Heat transfer by convection (External &Internal)
Week 12	Supplemental examples
Week 13	Heat transfer by convection (Natural)

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Radial temperature distribution for steady-state conduction
Week 2	Radial temperature distribution for steady-state conduction
Week 3	Use of the Fourier Rate Equation and Thermal Conductivity for Radial conduction
Week 4	Use of the Fourier Rate Equation and Thermal Conductivity for Radial conduction
Week 5	Unsteady State Conduction (Radial conduction)
Week 6	Unsteady State Conduction (Radial conduction)
Week 7	Heat transfer by Fins
Week 8	Heat transfer by Fins
Week 9	Temperature distribution along an extended surface
Week 10	Temperature distribution along an extended surface
Week 11	Heat Transfer by free convection and radiation
Week 12	Heat Transfer by free convection and radiation
Week 13	Constant of proportionality (thermal conductivity) k
Week 14	Constant of proportionality (thermal conductivity) k
Week 15	Test
Week 14	Supplemental problems
Week 15	Heat transfer by radiation
Week 16	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Holman, J.P., Heat Transfer, Tenth Edition, McGraw-Hill (2010).& Yunus, A. C., Heat and Mass Transfer, 6th. Edition (2020).	Yes
Recommended Texts	-FRANK P. INCROPERA / DAVID P. DEWITT / THEODORE L. BERGMAN / ADRIENNE S. LAVINE, Fundamentals of Heat and Mass Transfer, SIXTH EDITION (2007).	Yes

	-Cao, E., Heat transfer in process engineering, McGraw-Hill. - Serth, R.W., Process Heat Transfer, Principles and Applications, Elsevier.	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Reactor design II	Module Delivery
Module Type	Core learning activity	☐ Theory ☒ Lecture
Module Code	CHE 324	

ECTS Credits	5		☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
SWL (hr/sem)	125			
Module Level	UGIII	Semester of Delivery	6	
Administering Department		College		
Module Leader	Dr. Forat Yasir Sharrad	e-mail	furatyasir@mu.edu.iq	
Module Leader's Acad. Title	Asst. Prof	Module Leader's Qualification	Ph.D.	
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date		Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	CHE315	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	(a) Understand the concept of chemical reaction engineering. (b) Understand the chemical reaction engineering throughout the chemical reactors. (c) Explain the purpose of estimating the performance requirements, such as the yield, selectivity, limiting and excess reactants. (d) Understand the kinetics of homogeneous and heterogeneous reactors. (e) Explain the differences between the elementary and non-elementary reactions.
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	(f) Explain the differences between the concentration and temperature dependent terms of the rate equations. (g) Understand the concepts of Thermodynamics of the chemical reactions. (h) Conduct the rate constant and the order of the chemical reaction. (i) Understand the types of the chemical reactions and their effects on the rate of reaction equation form. (j) Explain the concepts of the homogeneous catalyzed reactions. (k) Understand the gaseous reactions throughout the chemical reactors. (l) Explain the basic Concepts of choosing the appropriate reactor type based on the nature of the chemical reaction. (m) Solve problems involving yield, selectivity, limiting and excess reactants, reactions orders, the rate constant, activation energy, and methods of half-life subject as well as the thermodynamics parameters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Communicate with state service institutions related to the nature of the program by providing engineering advice and participating or holding seminars and discussions 2- Improving their understanding of professional ethics, sustainability and occupational safety 3-Allows them to be influential engineers in society by finding solutions to industrial facilities problems related to the program
Indicative Contents المحتويات الإرشادية	Overview of Chemical Reaction Engineering Concentration and temperature dependent terms of a rate equation Kinetics of homogeneous reactors Thermodynamics of chemical reactions First and second order reversible reactions Gaseous Reactions

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor.

	Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental Concepts Used in Chemical Reactor Design
Week 2	Material and Energy Balances in the Design of Industrial Reactors
Week 3	Ideal Isothermal Reactors
Week 4	Ideal Isothermal Batch Reactors
Week 5	Isothermal Plug flow Reactors
Week 6	The Continuous Flow Stirred Tank Reactor (CSTR)
Week 7	Design for single reaction
Week 8	Size comparison of single reactors
Week 9	Variation of reaction ratio for second-order reactions
Week 10	Combinations of PFRs
Week 11	Stirred Tank Reactors in Series 1
Week 12	Stirred Tank Reactors in Series 2
Week 13	Mixed flow reactors of different sizes in series
Week 14	Reactors of different types in Series
Week 15	Catalysts
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Chemical Reaction Engineering by Levenspiel, Octave, John Wiley & Sons, 1999, (3rd Editions).	Yes
Recommended Texts	- Chemical Reactor Design by Harriott, Peter, Marcel Dekker Publisher, 2003, (1st Editions). - Elements of Chemical Reaction Engineering by Fogler, H. Scott, Prentice -Hall, 2004, (4th Editions).	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Thermodynamic II		Module Delivery
Module Type	Core learning activity		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 325		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGIII	Semester of Delivery	6
Administering Department		College	
Module Leader	Dr. Hameed Rasheed ALamery	e-mail	hameed_hrd@mu.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		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CHE316	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	(a) Understand the of introduction and basic concepts of thermodynamics. (b) Improve the efficiency of a process for the transformation between energy and work. (c) To study energy conversion in different forms. To study the entropy of a system. (d) To study of the relationship between properties of heat, temperature, energy, and work (e) Understand to the relationship between the laws of thermodynamics and the concepts of entropy and the Internal Energy Formula. (f) Study thermodynamics gives the basic concepts for heat engines, power plants, chemical reactions, refrigerators etc... (g) Use the thermodynamic rules to simulate energy, work, and heat exchanges. (h) Explained Mass and energy balances for open and closed systems. (i) Understand the applications of thermodynamics to flow processes such as turbine, compressors, pumps. (j) Application the thermodynamic equations to calculate the flow (both subsonic and supersonic) in pipes and nozzles. (k) Explain the concept of heat effects of industrial reactions and solve these problems. (l) Explain the basic Concepts of Refrigeration and Liquefaction and it applications. (m) Understand the explain the basic concepts of Carnot engine with ideal-gas-state working fluid and it applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Solve problems using the properties and relationships of thermodynamic fluids. 2- Analyses basic thermodynamic cycles. 3- Understand and apply the laws of thermodynamics and various methods of evaluating state properties to equipment of chemical engineering processes, such as turbines, pumps, engines, and refrigeration units. 4- Students must have understanding of thermodynamic fundamentals before studying their application in applied thermodynamics.

	5- The understanding of thermodynamic properties and processes will assist students in other related coursework
Indicative Contents المحتويات الإرشادية	Introduction and basic concepts of thermodynamics First law of thermodynamics Volumetric Properties of Pure Fluids Steam table heat effects of industrial reactions The Second Law of Thermodynamics

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Thermodynamic Properties Of Fluids Enthalpy And Entropy From Residual Properties
Week 2	Generalized Property Correlations For Gases 1- Lee – Kesler Generalized Equation 2- Virial equation.
Week 3	Applications Of Thermodynamics To Flow Processes, Nozzles, Throttling Process
Week 4	Exam 1
Week 5	Applications Of Thermodynamics To Flow Processes, Turbines (Expanders),
Week 6	Compression Processes and Pumps.
Week 7	Production Of Power From Heat, The Steam Power Plant
Week 8	Exam 2
Week 9	Refrigeration and Liquefaction 1-Carnot cycle (reverse Carnot cycle).
Week 10	2- Vapour – Compression Cycle A- With Turbine As Unit Of Expansion
Week 11	B- With Expansion Valve: (Ideal Cycle Vapor Compression).
Week 12	"Modification of vapor compression Refrigeration 1- Adding Heat Exchanger and Absorption
Week 13	Refrigeration."
Week 14	Liquefaction Processes: Linde and Claude.
Week 15	
Week 16	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	J. M. Smith; Et.AL., Introduction To Chemical Engineering Thermodynamics, Eighth Edition, Published By McGraw-Hill Education, Copyright © 2018	Yes
Recommended Texts	- Thermodynamics: An Engineering Approach 8th Edition Yunus A. Cengel, Michael A. Boles McGraw-Hill, 2015.	Yes

	- Y. A. Çengel and M. A. Boles, Thermodynamics: An Engineering Approach, 5th Edition Mc Graw-Hill, 2006.	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Equipment design I	Module Delivery
Module Type	Core learning activity	☐ Theory ☒ Lecture ☐ Lab
Module Code	CHE 326	
ECTS Credits	5	

SWL (hr/sem)	125		☒ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGIII	Semester of Delivery	6	
Administering Department		College		
Module Leader	Ihsan Habib Dakhil	e-mail	em2ihsan@mu.edu.iq	
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	M.Sc.	
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date		Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		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	To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: a- Equipment specifications: To understand the nature of chemical design structure and the anatomy of the chemical process. b- Cost Estimations: To understand how to make quick, rough, cost estimates to decide between alternative designs and for project evaluation.

	c- Flow-sheeting: Types of flow-sheet used in chemical engineering drawing and Equipment symbols. d- Piping and Instruments Diagrams: To get the knowledge for preparing PFD and P&I D diagrams. Pipe sizing, pipe fittings, valve type, and the specifications of pumps and compressors. e- Process vessels: vessels types and the specification difference.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	According to the results of the department program evaluation, at the end of this course, you must demonstrate the following relevant to the design of chemical engineering equipment: 1. Ability to demonstrate general knowledge of chemical processes & equipment design. 2. Ability on costing to create projects, 3. Ability to the general design chemical plants and construct flow sheets. 4. Ability to design piping systems & pumps. 5. Ability to design vessels and storage tanks, gas-liquid separation drums, and liquid-liquid separation. 6. Ability to design vessels and storage tanks.
Indicative Contents المحتويات الإرشادية	Flow-sheet and PID Cost Estimation Plant Layout Pressure Vessels Process Design of Heat Transfer Equipment Process design of Tray Distillation Column Process Design of Absorption Column

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- a- Work together in same-discipline teams to solve engineering problems. - b- To review state of the-art concepts for process intensification and design approaches used for such reactors. - c- Speed intuitive, predictability and evaluate information and ideas in the handling of chemical reactor issues.

Student Workload (SWL)

الحمل الدراسي للطلاب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	63	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	introduction
Week 2	Types of Designs
Week 3	"The Anatomy of Chemical Manufacturing Process "

Week 4	Equipment Specifications
Week 5	Flow-sheeting
Week 6	Piping and Instruments Diagram
Week 7	General Instrument and Controller Symbols
Week 8	Cost Estimations
Week 9	Plant Layout
Week 10	Process Vessels
Week 11	Equipment Selection
Week 12	Equipment Separation, liq.-liq. Sep.
Week 13	Equipment Separation, gas-liq. Sep.
Week 14	Equipment Separation, gas-solid sep.
Week 15	Storage Tanks
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Sinnott R.K., "Chemical Engineering Design," vol. 6, 4th edition, Coulson & Richardson's Chemical Engineering Series, Elsevier Butterworth-Heinemann, (2005).	Yes
Recommended Texts	- Sinnott R.K and Towler C., "Chemical Engineering Design," 5th edition. - Butterworth-Heinemann, (2009). - Coke A.K., "Ludwig Applied Process Design of Chemical and Petrochemical Plant," vol. 1, 4th edition Gulf professional Publisher, (2007). - Branan C., "Rules of Thumbs for Chemical Engineers," 4th edition Gulf professional Publisher, (2005). - Couper J., Penny W.R, Fair J. and Walas, "Chemical Process Equipment," 2nd edition, (2010).	Yes

	- Peters M, Timmerhause K.D and West R, "Plant Design and Economics for Chemical Engineers," 5th edition McGraw-Hill, (2003).	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Unit Operations I		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE 411			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGIV	Semester of Delivery	7	
Administering Department	Chemical	College	Engineering	
Module Leader	Prof. Dr. Raid Tariq Hade Alkhateeb		e-mail	dr.raidt@mu.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	6. Understand the Boundary layer. 7. Explain the Momentum, Heat, and Mass Transfer. 8. Explain the Reynolds analogy and Taylor-Prandtl modification. 9. Understand the Non- Newtonian Fluid. 10. Explain the basic concepts of liquid Mixing. 11. (m)Solve problems involving Boundary layer, Momentum, Heat, and Mass Transfer, Reynolds analogy, Taylor-Prandtl modification, Non-Newtonian Fluid and liquid mixing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Demonstrate an understanding of the concepts of unit operations to preparing qualified engineers in the field of chemical engineering to keep pace with contemporary developments and meet the requirements of the country's scientific and economic development plans. 2- Developing their ability in analysis and use of modern laboratory equipment and software to operate several types of units. 3- Developing their ability to conduct applied research that can contribute in serving the community. 4- Apply the above understanding to the analysis and designs of different unit operations. 5- Developing their ability to collecting informational resources and Communicate verbally with scientific societies to visualize and explain work in a more sophisticated way.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Boundary layer
Week 2	The turbulent portion of the Boundary layer for Momentum transfer
Week 3	The streamline portion of the Boundary layer for Momentum transfer
Week 4	The Boundary layer for Heat transfer
Week 5	The Boundary layer for Mass transfer
Week 6	Introduction to Momentum, Heat, and Mass Transfer.
Week 7	Reynolds analogy
Week 8	Mid-term
Week 9	Taylor-Prantl modification.
Week 10	Flow in pipe
Week 11	Introduction to Non- Newtonian Fluid
Week 12	Flow of Power-Law Fluids in pipe
Week 13	Introduction to liquid Mixing
Week 14	Standard Turbine Design

Week 15	Power Curve and Power consumed by agitation
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Reynold Analogy
Week 2	Reynold Analogy
Week 3	Sieving Analysis
Week 4	Sieving Analysis
Week 5	Drying
Week 6	Drying
Week 7	Sedimentation
Week 8	Sedimentation
Week 9	First Exam
Week 10	Filtration
Week 11	Filtration
Week 12	Membrane
Week 13	Membrane
Week 14	Mass transfer coefficient
Week 15	Second Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Chemical engineering volume 1 by. M. Coulson & J. F. Richardson., McGraw-Hill Publisher, 1999, (Sixth Edition).	Yes

Recommended Texts	- Fundamentals of FLUID MECHANICS by BRUCE R. MUNSON & DONALD F. YOUNG., John Wiley & Sons, Inc., 2002, (4th Editions). - FLUID MECHANICS AND HYDRAULICS by Jack B. Evett & Cheng Liu, McGraw-Hill Publisher, 1989.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Process control I		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE 412			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGIV	Semester of Delivery	7	
Administering Department	Chemical	College	Engineering	
Module Leader	Asst. Prof. Dr. Forat Yasir Sharrad		e-mail	furatyasir@mu.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Asst.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		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	12. Understand the concepts of process dynamic and control. 13. Understand the representative process control problems. 14. Explain the control system hardware elements. 15. Explain the classification of process control strategies. 16. Understand the process control diagrams. 17. Understand the theoretical models of chemical processes. 18. Understand the degrees of freedom analysis. 19. Conduct the Laplace transforms of representative functions. 20. Understand the types of the chemical reactions and their effects on the rate of reaction equation form. 21. Explain the transfer function models. 22. Understand the first-order systems. 23. Understand the response of first-order systems to various inputs. 24. Solve problems involving the process control diagrams, the theoretical models, the degrees of freedom analysis, Laplace transforms of representative functions, and first-order control systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Preparing qualified engineers in the field of processes control to keep pace with contemporary developments and meet the requirements of the country's scientific and economic development plans 2-Develop their skills in analysis, design, operation and use of modern laboratory equipment and software to conduct practical experiments of control tools used in chemical and petrochemical plants. 3-Increase their ability to communicate verbally with scientific societies to visualize and explain work of controlling processes in a more sophisticated way, as well as developing their ability to conduct applied research that can contribute in serving the community.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: - Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. - Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. - Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. - Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5
Unstructured SWL (h/sem)	73	Unstructured SWL (h/w)	5

الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
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% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Representative Process Control Problems
Week 3	Introductory concepts
Week 4	An industrial perspective of a typical process control problem
Week 5	Illustrative examples
Week 6	Control System Hardware Elements
Week 7	Classification of process control strategies
Week 8	Process Control Diagrams
Week 9	Theoretical models of chemical processes
Week 10	Degrees of freedom analysis
Week 11	Laplace transforms of representative functions

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Basic Process Control Unit
Week 2	Instruction Manual
Week 3	PCT40-Armfield-Process-Control-Manual
Week 4	PCT41-Armfield-Process-Control-Manual
Week 5	On/off level switch
Week 6	Differential level switch
Week 7	Manual operation of Normally Closed solenoid valve
Week 8	Proportional pressure input with on/off controller
Week 9	First exam
Week 10	Proportional pressure input with time proportional controller
Week 11	Manual operation of Proportioning Solenoid Valve
Week 12	Proportional pressure input with PID controller
Week 13	Manual operation of Normally Closed solenoid valve
Week 14	Proportional pressure input with on/off controller
Week 15	Second Exam
Week 12	Solution of differential equations by Laplace transform techniques
Week 13	Transfer Function Models
Week 14	First-Order systems
Week 15	Response of First-Order Systems to Various Inputs
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Text Books Process System Analysis and Control by Coughanowr, Donald, Joun Wiley & Sons, 1991, (2nd Editions).	Yes
Recommended Texts	- - Essentials od Process Control by Michael L. Luyben and Willium L. Luyben, McGraw -Hall Publisher, 1997, (1st Editions). - Process Modeling, Simulation, And Control For Chemical Engineers by Willium L. Luyben, Marcel Dekker Publisher, 1996, (2nd Editions).	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Equipment design II		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE 413			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGIV	Semester of Delivery	7	
Administering Department	Chemical	College	Engineering	
Module Leader	Prof. Ihsan Habib Dakhil	e-mail	em2ihsan@mu.edu.iq	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.	
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	CHE326	Semester	6
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: 2. Heat Transfer Equipment: Explain the different types of heat transfer equipment specifications. 3. Distillation Column: Explain the main factors that affect in the design of distillation columns and show the differences between the type of trays that are used. 4. Absorption Column: Understanding the mechanism working of this column as well as how to design the height bed and how to check the pressure drop through this column
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	According to the results of the department program evaluation, at the end of this course, you must demonstrate the following relevant to the design of chemical engineering equipment: 1. Ability to apply knowledge of chemical engineering principles, mass transfer, and heat transfer, 2. The ability to identify, formulate and solve problems by design, 3. An understanding of professional and ethical responsibility, 4. The ability to communicate with clients effectively, 5. An education essential to understanding the impact of an engineering solution in a global, economic, environmental, and societal context
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	a- Work together in same-discipline teams to solve engineering problems.
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	b- To review state of the-art concepts for process intensification and design approaches used for such reactors. c- Speed intuitive, predictability and evaluate information and ideas in the handling of chemical reactor issues.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Heat Transfer Equipment
Week 2	Temperature Profile
Week 3	Heat Transfer Equipment and its Specifications
Week 4	Types of Heat Exchanger and its Applications
Week 5	Process Design of Heat Transfer Equipment
Week 6	Distillation Column
Week 7	Distillation Column and its Specifications
Week 8	Process design of Tray Distillation Column
Week 9	Packed-bed Absorption Column
Week 10	Types of Packing bed
Week 11	Process Design of Absorption Column
Week 12	Flooding and pressure drop in Absorber
Week 13	Internals of Absorption Column
Week 14	Mixing Equipment
Week 15	Types of Mixing Equipment
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Sinnott R.K., "Chemical Engineering Design," vol. 6, 4th edition, Coulson & Richardson's Chemical Engineering Series, Elsevier Butterworth-Heinemann, (2005).	Yes
Recommended Texts	- Sinnott R.K and Towler C., "Chemical Engineering Design," 5th edition.	No

	- Butterworth-Heinemann, (2009). - Coke A.K., "Ludwig Applied Process Design of Chemical and Petrochemical Plant," vol. 1, 4th edition Gulf professional Publisher, (2007). - Branan C., "Rules of Thumbs for Chemical Engineers," 4th edition Gulf professional Publisher, (2005). - Couper J., Penny W.R, Fair J. and Walas, "Chemical Process Equipment," 2nd edition, (2010). - Peters M, Timmerhause K.D and West R, "Plant Design and Economics for Chemical Engineers," 5th edition McGraw-Hill, (2003).	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Computer application		Module Delivery
Module Type	Basic learning activities		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE414		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGIV	Semester of Delivery	
Administering Department	Chemical	College	Engineering
Module Leader	Mahmoud A. Sharshoh	e-mail	mahmoud.sharshoh@mu.edu.iq
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	01/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	5. To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: 6. (a) Understand the concept of simulation. 7. (b) Learning the use of HYSYS to calculate the thermodynamic properties 8. (c) Learning the use of HYSYS to make material balance. 9. (d) Learning the use of HYSYS to make Energy balance. 10. (e) Learning the use of HYSYS to make design and operation of reactor. 11. (f) Learning the use of HYSYS to make design and operation of distillation column. 12. (g) Learning the use of HYSYS to make design and operation of Liquid-Liquid extraction. 13. (h) Learning the use of HYSYS to make design and operation of Leaching Process. 14. (i) Learning the use of HYSYS to Estimated cost calculations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. Per the Department's program assessment outcomes, by the end of this course you should demonstrate the following.1- The ability to use a calculator to find thermodynamic properties. 7. 2-The ability to use the calculator to make calculations of the balance of matter and energy. 8. 3-The ability to use the calculator to perform equipment design and operation calculations. 9. 4-Ability to use calculator to control equipment.5-The ability to use the calculator in making estimates of costs.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: - Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. - Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. - Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.6

Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	100
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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	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Starting HYSYS
Week 3	Equation of State in HYSYS
Week 4	Case Study Using HYSYS V9
Week 5	Modeling of Pumping Process Using HYSYS V9
Week 6	Modeling of Compressing Process Using HYSYS V9
Week 7	Modeling of Expander Using HYSYS V9
Week 8	Mid exam
Week 9	Modeling of Heat Exchanger using HYSYS V9
Week 10	Modeling of Flash Separator Using HYSYS V9
Week 11	Conversion Reaction Using HYSYS V9
Week 12	Equilibrium Reaction Using HYSYS V9

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to Hysys
Week 2	Equation of state
Week 3	Case Study
Week 4	Modeling of Pump, Expander, & Compressor
Week 5	Bubble and Dew point calculation
Week 6	Modeling of Flash separator
Week 7	Modeling of Conversion reactor
Week 8	Modeling of Equilibrium reactor
Week 9	Modeling of CSTR
Week 10	Modeling of PFR
Week 11	Modeling of Heat Exchanger
Week 12	Modeling of Distillation column
Week 13	Modeling of Absorption column
Week 14	Modeling of Liquid-Liquid extraction
Week 15	Modeling of Leaching
Week 13	Modeling of Absorber Using HYSYS V9
Week 14	Modeling of Distillation Column Using HYSYS V9
Week 15	Modeling of Distillation Column Using HYSYS II V9
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Process analysis and simulation in chemical engineering. By Chaves, I. D. G., López, J. R. G., Zapata, J. L. G., Robayo, A. L., & Niño, G. R, 2015, springer.	Yes
Recommended Texts	- Hysys: An introduction to chemical engineering simulation by Hamid, M. K. A. (2007).	No
Websites		

Grading Scheme

مخطط الدرجات

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

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Project I		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	ENG 415		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGIV	Semester of Delivery	7
Administering Department	Chemical	College	Engineering
Module Leader	Group of Faculty Members	e-mail	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name	Name	e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	15. Each student will be assigned a problem (either individually or as part of a group), and expected to submit a complete design report which includes market research, process selection and design, economic evaluation, unit operations and equipment details, a full design of three units of the plant and all the supporting drawings
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be ready to design a complete process with all related calculations.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies	
استراتيجيات التعلم والتعليم	
Strategies	Student will conduct a full material balance, energy balance, equipment design, cost estimation, process plant, and environmental study along the year.

Student Workload (SWL) الحمل الدراسي للطلاب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	93	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	6.2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Chemical Engineering, Volume 6 , Nelson & Richardson	Yes
Recommended Texts	1-Chemical Process Engineering Design and Economics - H. Silla.	No

	2- Equipment Design Handbook for Refineries and Chemical Plants. Volume 2 by Frank L. Evans. 3- Introduction to Process Engineering and Design- S B Thakore. 4- Ullmann's Encyclopedia of Industrial Chemistry, 40 Volume Set	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Petroleum refining I		Module Delivery	
Module Type	Basic learning activities		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE416			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGIV	Semester of Delivery	7	
Administering Department	Chemical	College	Engineering	
Module Leader	Asst. Prof. Dr. Adil H. Rashid		e-mail	adil.hatem@mu.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Asst. Ph.	
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		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: 16. (a) Understand the concept of Petroleum Refining. 17. (b) Understand the definition and formation of Crude Oil. 18. (c) Explain the Chemical Composition and Classification of Crude Oils. 19. (d) Explain the Physical and Thermodynamics Properties of Petroleum. 20. (e) Explain the main Primary Petroleum Refining Processes. 21. (f) Explain the main Secondary (Finishing) Petroleum Refining Processes. 22. (g) Explain the main Upgrading Petroleum Refining Processes. 23. (h) Explain the Products Blending and Additives. 24. (i) Explain The Lubricating Oils Production. 25. (j) Explain the main Types of Gaseous Fuels
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Indicate what crude oils consist of and how crude oils are characterized based on their physical properties. 2. Express the objectives of petroleum refining and classify the processes used in petroleum refining. 3. Demonstrate how a petroleum refinery works and sketch a flow diagram that integrates all refining processes and the resulting refinery products. 4. Examine how each refinery process works and how physical and chemical principles are applied to achieve the objectives of each refinery process.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all
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	quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: ❑ Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. ❑ Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. ❑ Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction & Composition of Crude Oil.
Week 2	From Crude oil & Classification of Crude Oil.
Week 3	Physical & Thermodynamic Properties of Petroleum (1)
Week 4	Physical & Thermodynamic Properties of Petroleum (2)
Week 5	Analysis & Evaluation of Petroleum (1)
Week 6	Analysis & Evaluation of Petroleum (2)
Week 7	Class Review and First Month Exam
Week 8	Petroleum Refining Processes – Crude Desalination.
Week 9	Crude Distillation.
Week 10	Review & First Month Exam.
Week 11	Treating Processes (1).
Week 12	Treating Processes (2).
Week 13	Treating Processes (3).
Week 14	Raw materials storage

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Density
Week 2	Density
Week 3	Viscosity
Week 4	Viscosity
Week 5	Ash content
Week 6	Ash content
Week 7	Flash point
Week 8	Flash point
Week 9	Frist Exam
Week 10	Aniline point
Week 11	Aniline point
Week 12	Octane number
Week 13	Octane number
Week 14	Sulfur Content
Week 15	Second Exam
Week 15	Raw materials perparation
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Nelson, W. L. Petroleum Refinery Engineering, Tata McGraw Hill Publishing Company Limited, 1985.	Yes
Recommended Texts	1- C. Uttam, Fundamentals of Petroleum and Petrochemical Engineering, 8-Taylor & Francis Group, 2011. 2- S. J. David & R. P. Peter, Handbook of Petroleum Processing, Published by Springer, 2006. 3- M. R. Riazi, Characterization and Properties of Petroleum Fractions, First ed., USA, 2005. 4- S. Vastly, Crude Oil Chemistry, Marcel Dekker, Inc., 2003. 5- James G. Speight, Handbook of Petroleum Product Analysis, A John Wiley & Sons, Inc., Publication, 2002. 6- J. H. Gary & G. E. Handwerk, Petroleum Refining, Technology & Economics, 4th ed., Marcel Dekker, Inc., 2001.	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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Unit Operations II		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	CHE 421				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGIV	Semester of Delivery		8
Administering Department		Chemical	College	Engineering	
Module Leader	Prof. Dr. Raid Tariq Hade ALkhateeb		e-mail	dr.raidt@mu.edu.iq	
Module Leader's Acad. Title		Professor	Module Leader's Qualification		Ph.D.
Module Tutor	Name (if available)		e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	

Scientific Committee Approval Date	01/06/2023	Version Number	1.0
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Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CHE411	Semester	7
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	26. Explain the Types of Separation Techniques. 27. Understand the Packed column. 28. Explain the basic concepts of Fluidization. 29. Explain the Minimum fluidizing velocity. 30. Explain the basic concepts of the Filtration process. 31. Explain the basic concepts of the Centrifugal process. 32. (m)Solve problems involving Separation Techniques, Packed column, Fluidization, Sedimentation process, Filtration process, and Centrifugal process.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Preparing chemical engineer, that of being able to take a fundamental understanding of the unit operations and apply it to solve practical problems in a way that is both effective and elegant. 2- Developing their ability to understand the physical processes used to separate, transform, or transport materials in a process system. 3- Builds their critical thinking skills by emphasizing the thought processes that lead to model development. 4- Developing their ability to understanding of the assumptions and

	limitations of the theories used in unit operations. 5- Demonstrate their ability to conduct applied research and collect informational resources including data and evaluate these resources solve practical problems in unit operations.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1.Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2.Grading: •Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. •Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. •Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3.Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Introduction to fluid flow through packed column
Week 2	transfer Advantages and disadvantage of Packed column
Week 3	Streamline and turbulent flow in Packed column
Week 4	Flow of particles through fluids
Week 5	Introduction to Fluidizing velocity
Week 6	Minimum fluidization

Week 7	Introduction to Sedimentation
Week 8	Mid-term
Week 9	Equipment for Sedimentation
Week 10	Thickening zone in Sedimentation
Week 11	Introduction to Filtration.
Week 12	Classification of Filtration equipment
Week 13	Theory of Filtration
Week 14	Introduction to Centrifuge
Week 15	Classification and Theory of Centrifuge
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Syllabus)		
المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 1	Coagulation and Flocculation	
Week 2	Coagulation and Flocculation	
Week 3	Adsorption	
Week 4	Adsorption	
Week 5	Electro- coagulation	
Week 6	Electro- coagulation	
Week 7	Electro-Oxidation	
Week 8	Electro-Oxidation	
Week 9	First Exam	
Week 10	Packed Column	
Week 11	Packed Column	
Week 12	Diffusion	
Week 13	Mixing	
Week 14	Mixing	
Week 15	Exam	
Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?

Required Texts	- Chemical engineering volume 2 by. M. Coulson & J. F. Richardson., McGraw-Hill Publisher, 1999, (Sixth Edition).	Yes
Recommended Texts	- Fundamentals of FLUID MECHANICS by BRUCE R. MUNSON & DONALD F. YOUNG., John Wiley & Sons, Inc., 2002, (4th Editions). - UNIT OPERATIONS OF CHEMICAL ENGINEERING by Warren L. McCabe, Julian C. Smith & Peter Harriott, McGraw-Hill Publisher, 2004.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Process control II		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 422		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIV	Semester of Delivery	8
Administering Department	Chemical	College	Engineering
Module Leader	Asst. Prof. Dr. Forat Yasir Sharrad	e-mail	furatyasir@mu.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Asst.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	CHE412	Semester	7
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	33. Understand the concepts of process dynamic and control. 34. Understand the representative process control problems. 35. Explain the control system hardware elements. 36. Explain the classification of process control strategies. 37. Understand the process control diagrams. 38. Understand the theoretical models of chemical processes. 39. Understand the degrees of freedom analysis. 40. Conduct the Laplace transforms of representative functions. 41. Understand the types of the chemical reactions and their effects on the rate of reaction equation form. 42. Explain the transfer function models. 43. Understand the first-order systems. 44. Understand the response of first-order systems to various inputs. 45. Solve problems involving the process control diagrams, the theoretical models, the degrees of freedom analysis, Laplace transforms of representative functions, and first-order control systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Communicate with state service institutions related to the nature of the program by providing engineering advice and participating or holding seminars and discussions 2-Increasing their understanding of professional ethics, sustainability and occupational safety that allows them to be influential engineers in society by finding solutions to industrial facilities problems of control issues related to the program.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: - Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. - Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. - Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. - Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL)

الحمل الدراسي للطلاب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem)	150		

الحمل الدراسي الكلي للطالب خلال الفصل	
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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	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Lead/Lag System
Week 2	Pure Gain Systems
Week 3	Pure Capacity Systems
Week 4	Second-Order Systems
Week 5	Physical Examples of Second-Order Systems
Week 6	Response of Second-Order Systems to Various Inputs
Week 7	Steady-state error analysis
Week 8	Advantages and disadvantages of static error coefficients
Week 9	Dynamic error coefficients
Week 10	Block diagram development
Week 11	Block diagram development
Week 12	Signal flow graphs

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Proportional pressure input with time proportional controller
Week 2	Manual control of peristaltic outlet pump speed
Week 3	Proportional pressure input with PID controller
Week 4	Manual control of heater
Week 5	On/off control using proportional temperature input
Week 6	Time proportional control with proportional temperature input
Week 7	Proportional temperature input with PID control of heater
Week 8	First Exam
Week 9	Manual control of heater power
Week 10	Thermostat control
Week 11	Temperature input with on/off control
Week 12	Temperature input with time proportional control
Week 13	Proportional temperature input with PID control
Week 14	Manual control of pump speed
Week 15	Second Exam
Week 13	Signal flow graphs
Week 14	Stability
Week 15	Routh-Hurwitz stability criterion
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	Text Books Process System Analysis and Control by Coughanowr, Donald, John Wiley & Sons, 1991, (2nd Editions).	Yes
Recommended Texts	- Essentials of Process Control by Michael L. Luyben and William L. Luyben, McGraw-Hall Publisher, 1997, (1st Editions). - Process Modeling, Simulation, And Control For Chemical Engineers by William L. Luyben, Marcel Dekker Publisher, 1996, (2nd Editions).	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
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
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	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Petroleum refining II		Module Delivery	
Module Type	Basic learning activities		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CHE423			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGIV	Semester of Delivery	8	
Administering Department	Chemical	College	Engineering	
Module Leader	Asst. Prof. Dr. Adil H. Rashid	e-mail	adil.hatem@mu.edu.iq	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Asst. Ph.	
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	CHE416	Semester	7
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: 46. (a) Understand the concept of Petroleum Refining. 47. (b) Understand the definition and formation of Crude Oil. 48. (c) Explain the Chemical Composition and Classification of Crude Oils. 49. (d) Explain the Physical and Thermodynamics Properties of Petroleum. 50. (e) Explain the main Primary Petroleum Refining Processes. 51. (f) Explain the main Secondary (Finishing) Petroleum Refining Processes. 52. (g) Explain the main Upgrading Petroleum Refining Processes. 53. (h) Explain the Products Blending and Additives. 54. (i) Explain The Lubricating Oils Production. 55. (j) Explain the main Types of Gaseous Fuels
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Assess implications of changing crude oil feedstocks on refinery configuration and propose strategies to resolve conflicts with degrading crude oil quality and increasingly stringent environmental regulations on petroleum fuels. 2. Explain the main purpose, types, and methods of products blending & additives in petroleum processing. 3. Discuss different sources of gaseous fuels and explain how natural gas is processed at well sites and in processing plants with application of selected refinery processes and other physical operations.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the
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	material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: ❑ Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. ❑ Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. ❑ Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments. 3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Upgrading Processes – Coking.
Week 2	Visbreaking.
Week 3	Catalytic Cracking.
Week 4	Catalytic Hydrocracking.
Week 5	Upgrading Processes - Hydrotreating
Week 6	Catalytic Reforming & Isomerization
Week 7	Class Review and First Month Exam
Week 8	Alkylation
Week 9	Products Blending (1)
Week 10	Products Blending (2)
Week 11	Additives (1)
Week 12	Additives (2)
Week 13	Lubricating Oils (1)

Week 14	Lubricating Oils (2)
Week 15	Class Review and Second Month Exam
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Water Content
Week 2	Water Content
Week 3	Melting Point
Week 4	Melting Point
Week 5	Pour point
Week 6	Pour point
Week 7	Distillation Experiment
Week 8	Distillation Experiment
Week 9	Frist Exam
Week 10	Extraction Experiment
Week 11	Extraction Experiment
Week 12	Cetane number
Week 13	Cetane number
Week 14	Fractionating Distillation
Week 15	Second Exam

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

Required Texts	- Nelson, W. L. Petroleum Refinery Engineering, Tata McGraw Hill Publishing Company Limited, 1985.	Yes
Recommended Texts	1- C. Uttam, Fundamentals of Petroleum and Petrochemical Engineering, 8-Taylor & Francis Group, 2011. 2- S. J. David & R. P. Peter, Handbook of Petroleum Processing, Published by Springer, 2006. 3- M. R. Riazi, Characterization and Properties of Petroleum Fractions, First ed., USA, 2005. 4- S. Vastly, Crude Oil Chemistry, Marcel Dekker, Inc., 2003. 5- James G. Speight, Handbook of Petroleum Product Analysis, A John Wiley & Sons, Inc., Publication, 2002. 6- J. H. Gary & G. E. Handwerk, Petroleum Refining, Technology & Economics, 4th ed., Marcel Dekker, Inc., 2001.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Chemical and Petrochemical Industries		Module Delivery
Module Type	Basic learning activities		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CHE 424		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGIIV	Semester of Delivery	8
Administering Department		College	
Module Leader	Dr. Hameed Rasheed ALamery	e-mail	hameed_hrd@mu.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		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		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	To reach the general course goals, specific objectives were developed for each section of material that describe the concepts that I consider most critical for you to take from this course: (a) Study of the concepts of work to units operations in Petrochemical Industrial. (b) Explain of program industry petrochemical and which aims to prepare engineer with the ability to solve various industrial problems. (c) Improve the efficiency of the engineers and development of ability to production processes and operation of industrial units. (d) Understand and preparing drawings processes engineering in petrochemical industries. (e) Design, build and simulate the technology for petrochemical processes. (f) Explain the operating and maintaining chemical and petrochemical plants. (g) Explained units of operation for Polymer Manufacturing Processes. (h) Explained the natural gas treatment processes. (i) Study of many application of petrochemical industries such as Ethylene derivatives, Propylene derivatives, aromatic compounds, etc.... (j) Study and Classification Polymer Manufacturing Processes According To Preparation Methods. (k) Study of many application of polymer industries such as Polyethylene, Poly Propylene, Polystyrene, Polyvinyl Chloride (PVC). etc.... (l) Explain the many of Manufacture of polymer such as Fiber, Viscose Rayon, Nylon, etc.... (m) Understanding safety measurements, risk analysis and control of pollution in petrochemical industry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Per the Department's program assessment outcomes, by the end of this course you should demonstrate the following relevant to petrochemical industrial : 1) an ability to apply knowledge of reactor design, mass transfer, principles of chemical engineering, and thermodynamics, 2) an ability to conduct the connect between the units of operation, 3) Understanding safety measurements, risk analysis and control of pollution in petrochemical industry. 4) an understanding of professional and ethical responsibility, 5) an ability to communicate

	effectively, 6) an education necessary to understand the impact of engineering solution in a global, economic, environmental, and societal context, and 7) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
Indicative Contents المحتويات الإرشادية	Petrochemicals: Overview Natural gas treatment processes Aromatic production Ethylene derivatives Vinyl Chloride from Ethylene Manufacture of Viscose Rayon and Nylon Polymer Manufacturing Processes .polyvinyl chloride (PVC)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Group Assignment, Quizzes and Final Exam: Quizzes will be based on the material covered in class. This material comes from a variety of sources and may go beyond the information covered in the text. Quizzes and the final exam will typically consist of both quantitative and qualitative questions. In all quizzes or final exam you will need to show all work on quantitative problems. Pay attention to significant figures. Group assignments will be open book, note and neighbor. The quizzes will be closed book, notes and neighbor. Assignments that cannot be read or are not presented in a professional engineering style will not receive credit. Final exam will be comprehensive. 2. Grading: • Plagiarism: Plagiarism is a serious offense and will not be tolerated. Plagiarism will result in a zero for the assignment. • Due dates will be given in class. Late papers may be accepted but will be docked 10% per day, including weekends and starting immediately following class. Students with excused absences will be given a reasonable amount of time to catch up on their work with no penalty. No assignments will be accepted after the solution been returned or posted, whichever occurs first. • Group work: Unless stated otherwise, you are allowed to work in groups and can submit one assignment for the group. For some assignments, you will be required to work in groups. A common grade will be given on group assignments.

	3. Course Grade: Extra work will be given to individual students to improve grades when possible. I will provide you with your overall grade after each exam. All graded work will be used as a baseline for assigning grades. The following rating will be used for grading.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Petrochemicals: Introduction
Week 2	Petrochemicals: Overview
Week 3	Natural Gas
Week 4	Aromatic Production
Week 5	Chloromethane
Week 6	Ethylene derivatives, Vinyl Chloride from Ethylene.
Week 7	Ethylene derivatives, Ethylene oxide and Ethanol amines
Week 8	Exam 1
Week 9	Propylene derivatives, Isopropanol and Acetone from Propylene
Week 10	Propylene derivatives, Isopropanol and Acetone from Propylene
Week 11	Propylene derivatives, Cumene and Acrylonitrile from Propylene
Week 12	Butadiene and Benzene Manufacture
Week 13	Phenol from Cumene and Toluene
Week 14	Styrene and Phthalic Anhydride Production
Week 15	Exam 2
Week 16	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Vivek Patel, Advances in Petrochemicals, Published by AvE4EvA Copyright (2015).	Yes
Recommended Texts	- Ph.D. Sami Matar, Lewis Frederic Hatch ; Chemistry of PETROCHEMICAL PROCESSES; 2nd Edition Gulf Publishing Company(2000).	Yes

	- Donald L. Burdick William L. Leffler; PETROCHEMICALS in Nontechnical Language Fourth Edition Copyright © 2010 by PennWell Corporation.	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Engineering Project II		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	ENG 425			
ECTS Credits	8			
SWL (hr/sem)	200			
Module Level	UGIV	Semester of Delivery	8	
Administering Department	Chemical	College	Engineering	
Module Leader	Group of Faculty Members	e-mail		
Module Leader's Acad. Title	Professor	Module Leader's Qualification		
Module Tutor		e-mail		
Peer Reviewer Name	Name	e-mail		
Scientific Committee Approval Date		Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG415	Semester	7
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	56. Each student will be assigned a problem (either individually or as part of a group), and expected to submit a complete design report which includes market research, process selection and design, economic evaluation, unit operations and equipment details, a full design of three units of the plant and all the supporting drawings
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be ready to design a complete process with all related calculations.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Student will conduct a full material balance, energy balance, equipment design, cost estimation, process plant, and environmental study along the year.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem)	32	Structured SWL (h/w)	2
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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	168	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	11.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Chemical Engineering, Volume 6 , Nelson & Richardson	Yes
Recommended Texts	1-Chemical Process Engineering Design and Economics - H. Silla. 2- Equipment Design Handbook for Refineries and Chemical Plants. Volume 2 by Frank L. Evans.	No

	3- Introduction to Process Engineering and Design- S B Thakore. 4- Ullmann's Encyclopedia of Industrial Chemistry, 40 Volume Set	
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Ethics		Module Delivery	
Module Type	Support or related learning activity		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UNI426			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	UGIV	Semester of Delivery		
Administering Department	UNI	College	Engineering	
Module Leader		e-mail		
Module Leader's Acad. Title		Module Leader's Qualification		
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This Module explores the importance of ethics to society. It is designed to be used by lecturers to help their students understand the concept of society – sometimes defined as humankind as a whole, sometimes in relation to a particular place –and to investigate the ways in which ethical approaches can be applied to increase our understanding of society, and ultimately our attempts to improve it. It also aims to illustrate that ethics is part of the fabric of any dimension of society.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define the concept of society 2. Understand the relationship between ethics and society 3. Describe different theoretical approaches that inform this issue, with specific reference to social 4. contract theory 5. Articulate and defend a preferred position on the relationship between ethics and society while 6. appreciating its limitations
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>This course investigates advanced topics in ethics, with a focus on ‘second-order’ questions about the nature and significance of our ethical practices: What do our ethical expressions mean? What, if anything, makes these expressions true? How do moral values motivate? Is it irrational to be amoral? What are the similarities and differences between the domains of ethics and of science? Key texts from the twentieth and twenty-first century are explored and set in context with ethical thinkers of the more distant past. Relationships between ‘second- order’ and ‘first-order’ ethical questions are considered.</u>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Aspirations of Ethics
Week 2	Definitions of Justice in Iraq.
Week 3	Justice in the State
Week 4	Justice in the Individual
Week 5	Aristotle's Virtue Ethics: Happiness
Week 6	Aristotle's Virtue Ethics: The Function Argument and Practical Reason
Week 7	Aristotle's Virtue Ethics: Contemplation
Week 8	Kant's Moral Philosophy: The Groundwork
Week 9	Kant's Moral Philosophy: Autonomy
Week 10	Kant's Moral Philosophy: The Categorical Imperative
Week 11	Mill on Utilitarianism
Week 12	Utilitarianism, Justice and Rights
Week 13	Abortion and Euthanasia
Week 14	Life and Death
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Mackie, J. L., (1990), Ethics: Inventing Right and Wrong, London: Penguin. McNaughton, D. (2007), Moral Vision: An Introduction to Ethics, Oxford: Blackwell.	Yes

	William, B. (2006), Ethics and the Limits of Philosophy, Abingdon: Routledge.	
Recommended Texts	Cullity, G. and Gaut, B. (eds) (1997), Ethics & Practical Reason, Oxford: Clarendon. Darwall, S., Gibbard, A. and Railton, P. (eds) (1997), Moral Discourse and Practice: Some Philosophical Approaches, Oxford: Oxford University Press. Dreier, J. (ed.) (2006), Contemporary Debates in Moral Theory, Oxford: Blackwell. Enoch, D. (2011), Taking Morality Seriously: A Robust Defence of Moral Realism, Oxford: University Press. Harman, G. (1977), The Nature of Morality: An Introduction to Ethics, Oxford: Oxford University Press. Honderich, T. (1985), Morality and Objectivity: A Tribute to JL Mackie, Abingdon: Routledge. Hursthouse, R., Lawrence G., and Quinn, W. (eds) (1998), Virtues and Reasons: Philippa Foot and Moral Theory, Oxford: Clarendon Press.	No
Websites		

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

