MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Programming I**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**UOM103**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zahraa Ghanim Younis Al-alaf		**e-mail**	E-mail; zahraaalmajidi@uomosul.edu.iq	
Module Leader's Acad. Title	Ass. Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name:		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/09/2024		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Teaching the student to recognize the basic rules for dealing with and managing the computer to help him achieve Projects, print matters, prepare statistics and graphs, create presentations, design engineering graphics, and more.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Cognitive goals** 1. The student's comprehension of the material is the ability to analyze and apply what he learned practically on the computer 2. That the evaluation is done by presenting the material to the students in the laboratory and then applying what they learned from them 3. Software knowledge 4. Knowledge of programs creating presentations 5. Knowledge of applied software **B- The soft skills objectives of the course** 1. Turn on the computer 2. Learn the skill of editing, word processing and typing using Microsoft Word 3. Learn the skill of making and creating tables, curves and statistics in Microsoft Excel 4. Learn the skill of making presentations with Microsoft PowerPoint.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Computer education and Microsoft Office programs can include several different topics. Here is some basic how-to content that computer education and the Microsoft Office suite can cover: Computer basics: Computer concept and its basic parts. Operating system and user interface. Learn about the keyboard and mouse and how to control them. Take advantage of system files and folders. Microsoft Word: [10hr] Create and format documents. Insert and format text, images, tables, and graphics. Use styles, headings, and lists. Add margins, numbering, and undo. Prepare printing and shared documents. Microsoft Excel: [10hr] Create and format spreadsheets. Entering data and doing simple calculations. Create formulas and functions for complex calculations. Use graphs and charts to visualize data. Analyzing data and creating dynamic tables. Microsoft PowerPoint: Create presentations. [10hr]

	Formatting slides and adding text, images and graphics. Use effects and transitions between slides. Add audio and video to presentations. Make presentations and control slideshows.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Word software environment ,Basics of using Word
Week 2	Organizing, formatting and page settings
Week 3	Create and coordinate tables and insert pictures & charts
Week 4	Formatting tables and inserting pictures
Week 5	References & Mailings
Week 6	Complement the inclusion of graphics and spell checking
Week 7	Excel environment ,Basics of using Excel
Week 8	Mid-term Exam + Organizing worksheets and using formulas
Week 9	PowerPoint environment ,Basics of using PowerPoint
Week 10	Draw shapes and insert commands, slides, pictures, and videos
Week 11	Transition effects and motion
Week 12	Excel software environment ,Basics of using Excel
Week 13	Organizing, Tab insert &formatting and page settings
Week 14	Excel functions
Week 15	Charts in Excel
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Bernard V. Liengme /AGuide to Microsoft excel 2013 for scientists and engineers 2- Computer basics and office applications (Part 1) 3- a.m.d. Ziyad Muhammad Abboud, Prof. Dr. Ghassan Hamid Abd Al-Majid, Prof. Dr. Amir Hussein Mahmoud M. Bilal Kamal Ahmed (2014-2015)	Yes
Recommended Texts		No
Websites	https://www.microsoft.com/ar-iq/ https://scholar.google.com/schhp?hl=ar https://www.researchgate.net/ https://orcid.org/ https://libgen.is/ https://www.isbniraq.org/?product=%D8%A3%D8%B3%D8%A7%D8%B3%D9%8A%D8%A7%D8%AA-%D8%A7%D9%84%D8%AD%D8%A7%D8%B3%D9%88%D8%A8-%D9%88%D8%AA%D8%B7%D8%A8%D9%8A%D9%82%D8%A7%D8%AA%D9%87-%D8%A7%D9%84%D9%85%D9%83%D8%AA%D8%A8%D9%8A%D8%A9-%D8%A7	

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 9	Lab 9: Computer application draw shapes and insert commands, slides, pictures, and videos
Week 10	Lab 10: Computer application of transition effects and motion
Week 11	Lab 11: Computer application basics of using the excel program
Week 12	Lab 12: Computer application for organizing worksheets and using formulas
Week 13	Lab 13: Computer application for Excel Organizing, Tab insert &formatting and page settings
Week 14	Lab 14: Computer application for Excel functions
Week 15	Lab 15: Computer application for Excel charts

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 I			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**PRE105**				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Salah Aldeen		**e-mail**	zeadsalahaldeen@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Zahraa Ghanim – Ghufran Faris		**e-mail**	E-mail zahraaalmajidi@uomosul.edu.iq ghufranalrahhawi@uomosul.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/09/2024		**Version Number**	2.0	

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 Objectives **أهداف المادة الدراسية**	1. the student teach basics of engineering drawing 2. Learn the engineering processes such as drawing the parallel and perpendicular lines, bisection of angles. 3. Drawing geometric shapes. 4. Draw the cycle and arc with different tangent. 5. Application the scale on the all objects. 6. Setting the dimensions

	7. Conclusion the orthographic projection in the third angle. 8. three- dimension drawing using isometric method
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. The student will be able on understand the concepts of basic engineering drawing with create and draw different geometric shapes with any arcs. 2. Deal with any scale in the sit 3. Read the maps and dimensions in the sites. 4. To imagine any solid and hollow something with the possibility of drawing it. 5. Converting 3- dimensional shapes into 2- dimensional with different view (top view, front view and side view)
Indicative Contents **المحتويات الإرشادية**	Indicative content includes the following. **Introduction to engineering drawing** Engineering drawings specify the requirements of a component or assembly which can be complicated. Standards provide rules for their specification and interpretation. Standardization also aids internationalization, because people from different countries who speak different languages can read the same engineering drawing, and interpret it the same way. [4 hrs.] **Drawing of letters and type of line and pens** Lettering in Engineering drawing is the process of writing titles, subtitles, symbols, dimension value, notes, and other elements on a drawing. Lettering is used to specify details of an object on a drawing. The lettering in engineering drawing holds a very important factor which determines the quality of an engineering drawing. All the information about an element on a drawing is always indicated the form of lettering A variety of line styles graphically represent physical objects. Types of lines include the following:(visible, hidden, center, cutting plane). [4 hrs.] **Planning of sheet and millimeters units** Before the starting engineering drawing should plan how going to make best use of the space, divide the sheet on tittle area and work area. It is important to think about the number of views drawing will have and how much space you will use of the paper [4 hrs.] **Engineering Processes** Use different method and different tools to draw the engineering processes such as drawing the parallel and perpendicular lines, bisection of angles . [4 hrs.] **Drawing of arcs** Before the drawing circle or arc must be determined the center point and radius, and on the arc must be now the start end tangent and type of tangent to can be draw the arc. [8 hrs.]

	Geometric shapes (polygon and ellipse) A polygon is a two-dimensional closed shape that is made by three or more line segments. Thus, polygons can be categorized on the basis of different criteria which are:(The number of sides, Angles, Measurement of sides and angles (Regular Polygons)) Ellipse draw by two methods: four center method and ray method. [4 hrs.] **Drawing scale** Mean it change the size of object by multiplying each of the lengths by scale factor to make it larger or smaller. [4 hrs.] **Dimensions** This are set according the drawing laws to give indicated on the engineering drawing to define the size characteristics such as length, height, breadth, diameter, radius, angle, etc. [4 hrs.] **Projections** Conclusion the orthographic projection in the third angle method, and Converting 3-dimensional shapes into 2- dimensional with different view (top view, front view and side view). [12 hrs.] **Isometric drawing** Isometric drawing is particular drawing style where the angle between the X, Y and Z axes are all 120˚, and there is no perspective. An Isometric drawing is pictorial representation of on object in which all three dimension. [12 hrs.]
Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	After explain in the lecture the concepts of basic rules drawing engineering in class the student will able to solve some problems in the class with discuss the difficulties and problems that faced him and then he solve other problems in the home thus, the student becomes familiar with each topic separately. By the end of the semester the student will be familiar with all the rules of engineering drawing and translating maps for various engineering projection. Development the imagine for a solid and hollow

	something with the possibility of drawing it, and Converting shapes from 3-dimensional into 2- dimensional with different view.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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)	6 and 11	LO #1, #2 and #10, #11
	Assignments	1	5% (5)	12	LO #3, #4 and #6, #7
	Practical	1	15% (15)	Continuous	All
	Home work	1	15% (15)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	15% (15)	8	LO #1 - #7
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to engineering drawing, engineering drawing define and tools using
Week 2	Drawing of letters and type of line and pens
Week 3	Planning of sheet and millimeters units
Week 4	Engineering Processes
Week 5	Drawing of arcs
Week 6	Drawing of arcs and exam
Week 7	Geometric shapes (polygon and ellipse)
Week 8	Drawing scale Midterm Exam
Week 9	Dimensions
Week 10	Projections
Week 11	Projections and exam
Week 12	Projections
Week 13	Isometric
Week 14	Isometric
Week 15	Isometric
Week 16	Preparatory week before the final Exam

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

Required Texts	Engineering drawing and graphic technology Handbook, Thoumas,14 th edition (2010).	Yes
Recommended Texts		No
Websites	https://books.google.iq/books/about/Engineering_drawing_and_graphic_technolo.html?!d=mch-GSLgWKkC&redir_esc=y	

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 Mechanics I (Statics)			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PRE102				
ECTS Credits	8				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Salah Aldeen		**e-mail**	zeadsalahaldeen@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/09/2024		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of statics and applications physics theory through the application of techniques. 2. To understand forces, Moments and equilibrium system. 3. This course deals with the basic concept of Mechanical Engineering. 4. This is the basic subject for all statics and forces applications. 5. To understand concept of moment and forces problems.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write a Learning Outcomes, better to be equal to the number of study weeks. Statics is a type of science that helps people design safe and strong structures, like bridges and buildings. It's all about studying how things stay in place even when they are not moving. This is important for engineers and physicists who want to understand how materials react to different forces, like the ones that happen when an airplane takes off or lands. By studying statics, people can make better things and improve technology.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Newton's Theory Statics is a type of science that helps people design safe and strong structures, like bridges and buildings. It's all about studying how things stay in place even when they are not moving. This is important for engineers and physicists who want to understand how materials react to different forces, like the ones that happen when an airplane takes off or lands. By studying statics, people can make better things and improve technology. [15 hrs.] Statics is a branch of mechanics that deals with the study of stationary objects and systems under the action of external forces. In other words, statics is concerned with the analysis of forces acting on objects that are not in motion. It is an essential subject for engineers and physicists as it is the foundation for the study of mechanics, which is the branch of physics that deals with the motion of objects. Statics is a crucial sub-topic of mechanics and is essential in engineering and physics courses. [15 hrs.] It deals with the study of forces acting on objects that are not moving. The primary objectives of statics are to determine the forces acting on an object, the moments of forces acting on an object, and the equilibrium conditions of an object. The study of statics is essential for the design of structures, such as bridges, buildings, and machines, to ensure that they are safe and reliable. [10 hrs.] Revision problem classes [6 hrs.] The study of statics is also important in understanding the behavior of materials under different conditions. It helps engineers and physicists to understand how different materials react to external forces and how they can be designed to withstand these forces. For example, in aerospace engineering, the study of statics is essential in the design of aircraft and spacecraft to ensure that they can withstand the forces of takeoff, landing, and flight. In general, the study of statics is crucial for the development of new technologies and the improvement of existing ones. [15 hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to engineering mechanics
Week 2	Second Newton's Law
Week 3	Forces and Resultant
Week 4	Forces and Resultant
Week 5	Moment
Week 6	Moment
Week 7	Moment of Couple
Week 8	Free body diagram
Week 9	Equilibrium
Week 10	Equilibrium
Week 11	Centroid
Week 12	Centroid
Week 13	Moment of Inertia
Week 14	Moment of Inertia
Week 15	Frictions
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Engineering Mechanics (Statics) Hibbller 13rd Edition Meriam	Yes

Recommended Texts		No
Websites	https://www.google.com/search?client=firefox-b-d&q=engineering+mechanics+statics&si=AMnBZoFs9uB3Z_GHFPC_zPRokU4h1kiG1kM_Tt6zs41M5kAusrUywe1ttS3dYXXzQp9e0wyyHZ8lpNloWGPcATvDW7ntpdhPPVrc6JSu-QxYEZXpC1KVRcv7g6v9Xld3sYvWisKUoKjk&ictx=1&ved=2ahUKEwj18Lev0bH_AhUfxgIHHcJNDfMQnZMFegQIVRAC	

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			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOM102				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	**Semester of Delivery**		1
Administering Department		Petroleum Reservoir Engineering Department	**College**	Petroleum and mining engineering college	
Module Leader	Amira Rifae Hannawi		**e-mail**	amira.rifae@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		25/09/2024	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	6. to enable the learner to communicate effectively and appropriately in real life situation. 7. to use English effectively for study purpose across the curriculum. 8. to develop interest in and appreciation of language 9. to develop and integrate the use of the language skills i.e. Reading, Speaking and Writing . 10. to revise and reinforce structure and grammar already learnt.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Define The ability to read English with understanding the student is able to understand the total content 2. Identify the ability to understand English when it is spoken. 3. Promote the ability to write English correctly . 4. Outline the correct usage of the grammatical items. 5. Describing and Identify some concepts of petroleum and mining study to enhance students' lexicon of specific terms . 6. List students' weaknesses in an attempt to strengthen and overcome them
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Present tense Simple present tens , the uses of simple present tense , present continuous tense, present perfective tense, vocabularies . [15 hrs] Part B – past tense Simple past tens , the uses of simple past tense , past continuous tense, past perfective tense, vocabularies . [15 hrs] Part c – future Future forms, Hot verbs- take, put – Telephoning , Expressions of quantity. – 'export and ex'port, Business expressions and numbers Modals and rel. [15hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering English language is to encourage students' participation in the exercises, discussion and use brainstorming by asking many questions to keep in touch with the students . while at the same time refining and expanding their critical thinking skills and give and receive feedback from the students. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #3 #4and #6
	Assignments	2	10% (10)	2 and 12	LO #1 #2 and #5
	Report	1	10% (10)	13	LO #1#2 and #4

Summative assessment	**Midterm Exam**	2hr	10% (10)	7	All
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Simple present tens + vocabulary
Week 2	The uses of simple present tens + vocabulary
Week 3	present continuous tens + vocabulary
Week 4	Present perfective tense + vocabulary
Week 5	Present perfective continuous tense + vocabulary
Week 6	Examination
Week 7	Simple Past tense + vocabulary
Week 8	The uses of past tense + vocabulary
Week 9	Past continuous tense + vocabulary
Week 10	Past perfect tense + vocabulary
Week 11	Past perfective continuous tense + vocabulary
Week 12	Future forms, Hot verbs- take, put – Telephoning + vocabulary
Week 13	Expressions of quantity. – 'export and ex'port + vocabulary
Week 14	Business expressions and numbers + vocabulary
Week 15	Questions and negatives, - prefixes and antonyms, - Being polite +vocabulary
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	New-headway-plus-upper- intermediate-students-book. New-headway-plus-upperintermediate-students-workbook	No
Recommended Texts	Textbook and curriculums approved by the scientific committee and academic accreditation committee .	yes
Websites	Upper-Intermediate Fourth Edition | Headway Student's Site | Oxford University Press (oup.com) Tenses in Academic Writing | English for Uni | University of Adelaide	

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	**Principles of process engineering I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE111**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	PRE		**College**	PM	
Module Leader	Ahmad Abdulsalam Aabid		**e-mail**	E-mail; ahmadchemical1991@uomosul.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name:		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This module provides the introduction to chemical engineering for first year students. The material covered in the module will enable students to understand the professional role of a chemical engineer. The module introduces students to engineering problem solving approaches and applying fundamental principles to develop pragmatic solutions for topics such as process scale up. The methods applied are relevant tools used by chemical engineers in their day to day role. This

	module will also provide insights into the latest technology developments in the field of chemical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On successful completion of this course students will be able to:** **1 Perform calculations with different systems of units and apply concepts of dimensional consistency;** **2 Explain the various basic concepts used in chemical engineering and process calculations;** **3 Formulate and solve problems involving mass and energy balances;** **4 Demonstrate how to use computers for solving process design problems;** **5 Outline the various stages involved in undertaking engineering projects in the chemical process industry;** **6 Use key concepts of process simulation to solve an open-ended mass & energy balance for a relatively complex process flow sheet.** **7 Work efficiently and productively in small teams; and** **8 Compose a properly formatted design report.**
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to chemical engineering and the links to chemistry and other engineering disciplines: Modern chemical engineering: the paradigm shift Professional obligations of chemical engineering: safety and professional behaviour Elements and the Earth. Periodic Table. Laws of chemical combination. Atoms, subatomic particles, isotopes and molecules. Structure and bonding. Physical and chemical properties of matter. Intensive and extensive properties. Density and specific gravity. Moles and stoichiometry and chemical reactions. Kinetics, equilibrium, reaction engineering
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Concepts and methods will be introduced and demonstrated in lectures. Students will build up their understanding and competence by applying the methods they have learnt in tutorials. Timed assessment will be used at regular intervals to ascertain students' progress, provide feedback and extra support if needed.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	٩٠	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	٦
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٨٥	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Seminar	1	05% (05)	9	All
	Report	1	05% (05)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	15	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	DIMENSIONS, UNITS, AND THEIR CONVERSION
Week 2	Dimensional Consistency (Homogeneity)
Week 3	MOLES, DENSITY, AND CONCENTRATION
Week 4	ITRODUCTION TO MATERIAL BALANCES

Week 5	Steady-State and Unsteady-State Systems
Week 6	Accounting for Chemical Reactions in Material Balances
Week 7	THE CHEMICAL REACTION EQUATION AND STOICHIOMETRY
Week 8	MATERIAL BALANCES FOR PROCESSES INVOLVING REACTION
Week 9	Processes Involving Multiple Reactions
Week 10	MATERIAL BALANCES FOR PROCESSES INVOLVING COMBUSTION
Week 11	MATERIAL BALANCES FOR PROCESSES INVOLVING RECYCLE WITHOUT CHEMICAL REACTION
Week 12	Recycle with Chemical Reaction
Week 13	MATERIAL BALANCES FOR PROCESSES INVOLVING BYPASS
Week 14	MATERIAL BALANCES FOR PROCESSES INVOLVING PURGE
Week 15	Midterm Exam
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- • R.M. Felder, R.W. Rousseau, & L.G. Bullard, 2015, Elementary Principles of Chemical Processes, 4th Edition, Wiley.	Yes
Recommended Texts	1. D. M. Himmelblau & J. B. Riggs, "Basic Principles and Calculations in Chemical Engineering", Prentice-Hall, 8th Edition, 2012.	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	**Mathematics I**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE101**				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ghufran Faris Abdullah alrahhawi		**e-mail**	ghufranalrahhawi@uomosul.edu.iq	
Module Leader's Acad. Title	Ass. Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	٢/٥٥/2025		**Version Number**	٢	

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 Objectives أهداف المادة الدراسية	The objective of the course is to present straight line, derivative, Limit, the integral, application to definite integral, the matrix, application of matrix, grammar method to solving linear system, hyperbolic Functions and derivatives and Integrals of hyperbolic functions.
Module Learning Outcomes	It is expected from the student who passes this module learn the following topics: 1. Straight line

مخرجات التعلم للمادة الدراسية	2. Derivative 3. Limit 4. Integral , application, and method of integral. 5. The Matrix and its operations 6. Application of matrix. 7. Hyperbolic Functions 8. Derivatives and Integrals of hyperbolic functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1.Straight line slope, types, equation of straight line. [4hrs.] 2. Derivative derivative of various functions, chain rule, implicit deifferintion , applications [12 hrs.] 3. Limit Limit of different functions, Hopital's rule [4hrs.] 4. The integral definite and indefinite integrals. [4hrs.] 5. Application to definite integral Area – Volumes – arc length. [16hrs.] 6. The Matrix The Matrix and its operations, application of matrix, grammer method to solving linear system. [٢٠ hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students The usual theoretical presentation method using the writing board and depending on the method (how and why) of the subject and according to the curriculum of the subject.
Student Workload (SWL)	

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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**	3	20% (20)	4,6 and 13	LO #1,#2,#6 and #11
	Assignments	8	10% (10)	2 and 12	LO #2, #4 ,#5,#6,#7,#11,#12.#13 and #15
	Projects / Tutorial	1	10% (10)	Continuous	All
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)	10	LO #1 - #10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Straight line: slope, types, equation of straight line
Weeks 2-4	Derivative: derivative of various functions, chain rule, implicit deifferintion, applications .**(Quiz1)**
Week 5	Limit: Limit of different functions, Hopital's rule

Week 6	The integral: definite and indefinite integrals. **(Quiz 2)**
Week 7-10	Application to definite integral: Area – Volumes – arc length . **(Mid Exam)**
Week11	The Matrix and its operations.
Week12	The determenants and its applications – inverse matrix by cofactor.
Week13	The determenants and its applications – inverse matrix by cofactor.
Week14	The determenants and its applications – inverse matrix by cofactor.
Week15	Grammer method to solving linear system. **(Quiz3)**
Week16	Preparatory week before the final Exam

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	**Analytical Chemistry**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒**Lab** ☐**Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**PRE123**				
ECTS Credits	5				
SWL (hr/sem)	100				
Module Level		1	**Semester of Delivery**		2
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Liqaa Majdal		**e-mail**	E-mail; l.ides.saaed@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		PhD – Assistant Professor
Module Tutor	Dr. Semaa I. Khaleel		**e-mail**	semaaibraheem@uomosul.edu.iq	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/09/2024	**Version Number**		2.0

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 Objectives أهداف المادة الدراسية	This module aims to:

	• Introduce the fundamental principles of analytical chemistry, including qualitative and quantitative analysis techniques relevant to petroleum systems. • Develop students' proficiency in laboratory practices, including sample preparation, titration, spectroscopy, and chromatographic analysis, with emphasis on petroleum-based materials. • Apply analytical methods to petroleum engineering problems, such as crude oil characterization, fuel quality testing, and contaminant identification. • Enhance students' ability to interpret, evaluate, and report analytical data, ensuring accuracy and reliability in industrial and environmental petroleum applications. • Foster critical thinking and problem-solving skills through real-world case studies and practical exercises relevant to refining, quality control, and regulatory compliance. • Promote understanding of international standards and safety protocols in chemical analysis within the petroleum industry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: • Explain the theoretical foundations of analytical chemistry techniques, including volumetric, gravimetric, spectroscopic, and chromatographic methods. • Identify and select appropriate analytical techniques for characterizing petroleum samples, such as crude oil, fuels, and refinery products. • Perform standard laboratory procedures for chemical analysis with precision and adherence to safety and quality standards. • Analyze and interpret experimental data to determine composition, purity, and contaminants in petroleum-related materials. • Evaluate the reliability and limitations of analytical results, considering sources of error and method validation. • Apply analytical results to solve engineering problems related to quality control, process optimization, and environmental monitoring in petroleum operations. • Communicate laboratory findings effectively, using technical reports and standardized documentation formats used in the petroleum industry.
Indicative Contents	The module will cover the following key topics:

المحتويات الإرشادية	• Role of analytical chemistry in upstream and downstream petroleum operations
	
	• Classification of analytical methods used in petroleum labs (qualitative vs. quantitative)
	
	• Chemical calculations for refinery analysis: concentration, ppm, molarity, and stoichiometry
	
	• Precision, accuracy, data validation, and sources of error in petroleum testing
	
	• Volumetric analysis of petroleum products:
	
	  • Acid-base titrations for additives and neutralization number
	  • Redox titrations (e.g., oxidation stability, sulfur compound analysis)
	
	• Gravimetric techniques for solid impurities in crude oil and refinery residues
	
	• Spectroscopic analysis of petroleum samples:
	
	  • UV-Vis for fuel blending and dye concentration
	  • Atomic Absorption Spectroscopy (AAS) for metal detection in fuels
	  • Infrared (IR) for hydrocarbon functional group identification (e.g., aromatics, paraffins)
	
	• Chromatographic techniques in petroleum analysis:
	
	  • Gas Chromatography (GC) for hydrocarbon profiling and boiling point distribution
	  • HPLC for additive, lubricants, and polymer content
	
	• Trace and elemental analysis in petroleum:
	
	  • Sulfur, nitrogen, lead, and vanadium detection
	  • Techniques: XRF, ICP, and elemental analyzers
	
	• Water and environmental testing:
	
	  • Oil-in-water content in effluents
	  • pH, COD, BOD for refinery wastewater monitoring
	
	• Quality assurance and control in petroleum labs:
	
	  • ASTM, IP, and ISO standard testing procedures
	  • Calibration, validation, and reproducibility of results
	
	• Industrial case studies and applications:
	
	  • Crude oil assay interpretation
	  • Fuel quality testing (diesel, gasoline, kerosene)
	  • Analytical troubleshooting in process units (e.g., desalting, hydroprocessing)

Learning and Teaching Strategies	

استراتيجيات التعلم والتعليم	
Strategies	Learning and Teaching Strategies – Analytical Chemistry for Petroleum Engineering Lectures with engineering context Deliver core analytical chemistry concepts with direct applications to petroleum processes, refining operations, and environmental monitoring. • Laboratory-based practical sessions • Reinforce theoretical knowledge through hands-on experiments involving petroleum samples (e.g., titrations, spectroscopy, chromatography). • Case study analysis • Use real-world petroleum industry case studies (e.g., crude oil assay, fuel contamination incidents) to develop problem-solving skills. • Group projects and collaborative tasks • Encourage teamwork through small-group investigations of analytical challenges related to petroleum quality control or pollution monitoring. • Interactive discussions and Q&A sessions • Promote active learning through student-led discussions on current industry standards (e.g., ASTM, ISO) and analytical technologies. • Field visits and industrial observations • Offer exposure to petroleum laboratories or refineries (where applicable) to observe industrial analytical practices in action. • Use of modern digital tools and simulations • Integrate software for chromatographic data analysis, spectral interpretation, and virtual labs to enhance digital competency.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	100	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	50	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem)	**200**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of Analytical Chemistry in Petroleum Engineering: Scope, Applications, and Industry Relevance
Week 2	Classification of Analytical Methods and Their Use in Petroleum Labs (Qualitative, Quantitative, Instrumental)
Week 3	Chemical Calculations in Petroleum Analysis: % Composition, API, ppm, wt%, mg/L
Week 4	Data Quality and Error Analysis in Refinery Testing: Repeatability, Reproducibility, ASTM Compliance
Week 5	Acid-Base Titrations in Petroleum: TAN (Total Acid Number), TBN (Total Base Number)
Week 6	Redox Titrations for Additive and Oxidation Analysis (e.g., Iodine Number, Mercaptans)
Week 7	Gravimetric Analysis in Oil Sludge and Solids Testing (Filtered Solids, Ash Content)
Week 8	UV-Vis Spectroscopy in Fuel Identification and Dye Quantification

Week 9	AAS and ICP for Heavy Metals (e.g., Vanadium, Nickel, Lead) in Crude and Residues
Week 10	IR Spectroscopy for Functional Group Detection in Hydrocarbons (Aromatics, Paraffins)
Week 11	Gas Chromatography (GC) in Refinery Product Characterization: Naphtha, Diesel Cuts
Week 12	Elemental and Trace Contaminant Analysis: Sulfur, Nitrogen, and Lead – Methods and Equipment
Week 13	Environmental Testing: Oil-in-Water, COD, BOD in Refinery Effluents
Week 14	Quality Control Standards in Petroleum Labs: ASTM, ISO, and Iraqi National Standards
Week 15	Crude Assay Interpretation and Final Project Presentations: Fuel Certification and Compliance Use Cases
Week 16	**Preparatory week before the final Exam**

very Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: -Familiarization with chemical laboratory tools (burettes, pipettes, volumetric flasks,… etc.)
Week 2	Lab 2: -Methods of handling and disposing of chemicals. -Laboratory safety rules.
Week 3	Lab 3: - Gravimetric Analysis. - Principles of gravimetric analysis. - Preparation and drying of the precipitate.
Week 4	Lab 4: - Qualitative analysis. -Qualitative analysis.
Week 5	Lab 5: - Detection of first group ions.
Week 6	Lab 6: Detection of Group II ions.
Week 7	Lab 7: Detection of Group III ions.
Week 8	Lab 8: - Detection of group IV and V ions.
Week 9	Lab 9: Detecting negative roots.
Week 10	Lab 10: Volumetric Analysis.
Week 11	Lab 11: Acid-Base Titration.
Week 12	Lab 12: - Precipitation Titration. - Mohr's method.

	- Fajans method.
Week 13	Lab 13: Complexometric Titration. - Use of EDTA in the determination of calcium and magnesium.
Week 14	Lab 14: Redox Titration.
Week 15	Lab 15: - Iron determination using sodium thiosulfate. -Potassium permanganate titration against sodium or iron oxalate ($KMnO_4$).
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Nelson, L. (2020). *Environmental Pollution Control in Petroleum Operations*. Gulf Publishing. • Harris, D. C. (2022). *Quantitative Chemical Analysis*. W. H. Freeman.	Yes
Recommended Texts	• Skoog, D. A., Holler, F. J., & Crouch, S. R. (2017). *Principles of Instrumental Analysis*. Cengage Learning. • Khopkar, S. M. (2004). *Basic Concepts of Analytical Chemistry*. New Age International. • ASTM and ISO standards for petroleum product analysis.	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	**Arabic I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**UOM101**			☒ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐**Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ahmed Mohammed Ali		**e-mail**	ahmed.m.ali@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	20/1/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The aim of this semester is to enable students to read correctly and acquire the ability to use language correctly in communication with others, such as speed, quality of delivery, and eloquence. It also aims to teach students to listen well, develop their literary taste, and accustom them to correct, clear expressions

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**CLO1:** Introducing the student to the necessity of practicing the rules of writing and speaking in classical Arabic . **CLO2:** Introducing the student to the levels of the Arabic language system **CLO3:** Deepening the student's connection with the Arab and Islamic heritage. **CLO4:** Promote scientific research in the field of Arabic language and its sciences to prepare studies and research . **CLO5:** Showing the beauty of the Arabic language, the breadth of its meanings and its constructional styles. **CLO6:** Enabling the student to overcome and correct linguistic errors . **CLO7:** Developing the student's literary taste to understand the aesthetic aspects of speech style, images and meanings . **CLO8:** Introducing the most prominent poets of the Abbasid era
Indicative Contents المحتويات الإرشادية	• أهمية اللغة العربية ونشأة علوم اللغة العربية • الأفعال • المبتدأ والخبر • النواسخ : كان واخواتها • ان واخواتها • علامات الترقيم • أخطاء لغوية شائعة • خصائص الشعر والنثر • المنصوبات • المفعول به • المفعول لأجله • المفعول المطلق • قواعد العدد • حية الشاعر السياب ومميزات شعره

	• نص شعري للسياب

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary goal of Arabic language lessons is to eliminate the difficulty and rigidity that may accompany some of the topics covered in these lessons, in addition to conveying the required ideas and information to students in ways that are understandable and appropriate to their individual differences. The most prominent focus of the lectures is Arabic grammar and literature. The study consists of lectures, exams, in-class assignments, discussions, and homework.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	**Material Covered**
Week 1	أهمية اللغة العربية ونشأة علوم اللغة العربية
Week 2	الأفعال

Week 3	المبتدأ والخبر
Week 4	النواسخ : كان واخواتها
Week 5	ان واخواتها
Week 6	علامات الترقيم
Week 7	أخطاء لغوية شائعة
Week 8	خصائص الشعر والنثر
Week 9	المنصوبات
Week 10	المفعول به
Week 11	المفعول لأجله
Week 12	المفعول المطلق
Week 13	قواعد العدد
Week 14	حية الشاعر السياب ومميزات شعره
Week 15	نص شعري للسياب

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	اللغة العربية لأقسام غير الاختصاص/ مجموعة من المؤلفين	YES
Recommended Texts	كتب النحو /كتب الاملاء/المنهاج في القواعد والإعراب	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

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DULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Drawing II			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**PRE121**				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Salah Aldeen		**e-mail**	zeadsalahaldeen@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Zahraa Ghanim – Ghufran Faris		**e-mail**	E-mail zahraaalmajidi@uomosul.edu.iq ghufranalrahhawi@uomosul.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/01/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives **أهداف المادة الدراسية**	Get acquainted with the program interface and the various toolbars for development Design frameworks and prototypes for projects Training in the AutoCAD program and dealing with all its tools professionally, drawing geometric shapes, polygons, the ellipse, setting dimensions, creating different layers

	commensurate with the needs of the engineer in various specializations, and learning how to draw from walls, columns, pipes, and so on. Developing the skill of division, creating plans, and enhancing structural drawings and three-dimensional models. Finally, practice how to draw an integrated project.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	Use the program and know its capabilities. Through this chapter students are able to create two-dimensional and three-dimensional drawings and diagrams through a detailed explanation of the advantages of AutoCAD, realizing the basic concepts in the AutoCAD two- and three-dimensional program. Developing skills in the field of engineering drawing, deducing heights and dimensions in drawing, as well as the possibility of placing them on different drawings , Doing colorful designs and multiple specializations. And dealing with keyboard shortcuts on the computer to achieve speed in work and skill. Possess the ability to deal with the AutoCAD program to serve the work and reduce the possibility of error. Gain the skill of drawing diagrams with colored interfaces. Draw everything that comes to mind in his specialty. As well qualification to deal with other engineering programs. Working in external companies as a specialist in AutoCAD drawing
Indicative Contents **المحتويات الإرشادية**	Indicative content includes the following. **Introduction to AutoCAD programs.** Get acquainted with the program interface Ribbons tool boards Setting the program interface Work file preparation Use drawing tools Open a new job file Save and open work files Undo and delete commands Field of view control commands Shortcut Menus [4 hrs.] **Drawing toolbar** Use the coordinate system in the drawing Draw straight lines

	Use the Polyline command Draw curves using the Polyline command Draw circles Draw arcs Draw Spline and Revision Cloud elements Draw ellipses Draw polygons Use the Sketch command Draw parallel lines, loops and points Draw rectangles Dynamic input of coordinates [8 hrs.] **Grid and Object Snap** Grid usage Grips control points Auto track Attraction Properties Object Snap Tracking property Geometry Calculator Quick Calculator Ortho mode Polar tracking Hatching [8 hrs.] **Modifying toolbar** Copy و Move Offset Polar Array Rectangular Array Path Array Mirror

	Extend Stretch Scale and Rotate Fillet Chamfer Trim Explode and Break Lines to Polylines Join [8 hrs.] **Draw ellipses and polygons** Use an ellipse command to draw ellipse and semi or part of ellipse , and use polygon command to draw any polygons. [4 hrs.] **Layers and text** Create Layers Layer properties control Control of layers using the Layers set Named Layer Filter [4 hrs.] **Dimensions** Continuous, Baseline Dimensions radius Jogged and Arc Length Editing Dimensions Dimension Styles: • Lines • Symbols and Arrows • Text • Leaders • Leaders • Multi leader Styles

	• Fit [4 hrs.] **Print** Plot Styles Create a Color Dependent Plot Style Set up the Color Dependent printing specification Create a Named Plot Style [4 hrs.] **Projection** Practice drawing projections using AutoCAD programs. [4 hrs.] **Isometric** Draw three dimension object by use iso snap command[8 hrs.] **Draw solids and simply three Dimensional shape** Draw 3D Modeling by use Solid command and rotate the object to look at him from multi angle. [4 hrs.]
Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	The student learns the skills of using the AutoCAD program from scratch until drawing horizontal plans and plans Where everything related to the program will be explained, including drawing commands, modification commands, coloring commands, annotation, writing, and layer creation The explanation will not be theoretical, but there will be a practical application for each of the commands in the laboratory in addition to the homework, as well as the student draws several projections to master the commands that he learned and put the necessary dimensions and clarifications, as well as drawing three-dimensional figures. At the end of the course, the student will be able to draw diagrams, projections, and models by himself, with knowledge of all the program commands. Thus, the student will also be able to draw any form of two-dimensional and three-dimensional geometry

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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 and 12	LO #1, #2 and #10, #11
	Assignments	1	5% (5)	13	LO #3, #4 and #6, #7
	Practical	1	15% (15)	Continuous	All
	Home work	1	15% (15)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	15% (15)	8	LO #1 - #7
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to AutoCAD programs.

Week 2	Drawing toolbar and Modifying toolbar
Week 3	Grid and Object Snap
Week 4	Drawing toolbar and Modifying toolbar
Week 5	Drawing toolbar and Modifying toolbar
Week 6	Drawing toolbar and Modifying toolbar
Week 7	Grid and Object Snap
Week 8	Draw ellipses and polygons
Week 9	Layers and text
Week 10	Dimensions
Week 11	Print
Week 12	Projection
Week 13	Isometric
Week 14	Isometric
Week 15	Draw solids and simply three Dimensional shape
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	AutoCAD 2020 Beginners Guide, ,7th Edition, CADFolks An Introduction to AutoCAD for Beginners	No
Recommended Texts		No
Websites	https://ketabton.com/index.php/book/13747	

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	**Principles of process engineering I I**			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PGR121**				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		1	**Semester of Delivery**		2
Administering Department		PRE	**College**	PME	
Module Leader	Ahmad Abdulsalam Aabid		**e-mail**	E-mail; ahmadchemical1991@uomosul.edu.iq	
Module Leader's Acad. Title		lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name:		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2025	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This module covers the chemical aspects of thermodynamics, equilibria, and kinetics, with a focus on their relationship to mass and energy balances and application of the concepts of physical chemistry in chemical engineering.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Having successfully completed this module, you will be able to demonstrate knowledge and understanding of:** **Describe and calculate the thermodynamic variables (enthalpy, entropy, internal energy, Gibbs energy, and Helmholtz energy) that describe chemical reactions and transformations.** **Use phase diagrams thermodynamic data tables to describe and analyse the properties of single and multi-component chemical systems.** **Perform mass and energy balance calculations representative of chemical processes.** **Calculate the equilibrium constant for a chemical process and describe the effects of changes in conditions (temperature, pressure, and composition) on the value of the equilibrium constant.** **Determine the order of a chemical reaction and write expressions for the rate law, explaining the effects of temperature on the rate constants and outcome of the reaction.**
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Basic calculations for reactions in solution and chemical reaction kinetics. Scientific measurements: Uncertainty. Significant figures. Accuracy and precision. Dimensional analysis; Primary and derived SI units. Introduction to mass and energy balances: Calculating flow rates and calculations involving the first law of thermodynamics. Pumps: types, NPSH Piping and valves Tanks and vessels Liquid and gas handling Principles of fluid mechanics, heat transfer, mass transfer and equilibrium stages. Introduction to unit operations. Chemical engineering concepts: Design, scale up techniques, process modelling and design of experiments. Different types of reports in chemical engineering.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Concepts and methods will be introduced and demonstrated in lectures. Students will build up their understanding and competence by applying the methods they have learnt in tutorials. Timed assessment will be used at regular intervals to ascertain students' progress, provide feedback and extra support if needed.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	٩٠	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	٦
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٨٥	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Seminar	1	05% (05)	9	All
	Report	1	05% (05)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	15	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	Chemical thermodynamics
Week 2	Determining the changes in thermodynamic variables that accompany expansion

Week 3	phase diagrams of pure substances and thermodynamics of phase transitions
Week 4	Energy balances from chemical thermodynamics: open and closed systems
Week 5	Mixtures: the thermodynamic description of mixtures; solutions and their properties
Week 6	Phase diagrams of binary and ternary systems
Week 7	Ideal and non-ideal behaviour
Week 8	Chemical potential, activity, and fugacity.
Week 9	Chemical equilibria: application of the concepts of Gibbs energy
Week 10	Equilibrium constants; the phase rule; response of equilibrium to changes.
Week 11	Chemical kinetics: reaction orders and rate laws
Week 12	Enthalpy of reaction
Week 13	Energy balances/heat transfer
Week 14	Temperature dependence of vapor pressure of a liquid
Week 15	Midterm Exam
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	2- • R.M. Felder, R.W. Rousseau, & L.G. Bullard, 2015, Elementary Principles of Chemical Processes, 4th Edition, Wiley.	Yes
Recommended Texts	1. D. M. Himmelblau & J. B. Riggs, "Basic Principles and Calculations in Chemical Engineering", Prentice-Hall, 8th Edition, 2012.	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

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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	**PRE122**				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ghufran Faris Abdullah alrahhawi		**e-mail**	ghufranalrahhawi@uomosul.edu.iq	
Module Leader's Acad. Title	Ass. Lecturer		**Module Leader's Qualification**	M.Sc.	
			e-mail	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/01/2025		**Version Number**	2	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of the course is to present Transcendental function ,Application of exponential and logarithimic function ,Hyperbolic Trigonometric function and inverse Hyperbolic Trigonometric function, Methods of integral
Module Learning Outcomes	It is expected from the student who passes this module learn the following topics: 9. Transcendental function

مخرجات التعلم للمادة الدراسية	10. Application of exponential and logarithimic function 11. Hyperbolic Trigonometric function and inverse Hyperbolic Trigonometric function 12. Methods of integral.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. 1. Transcendental function logarithimic function , inverse Trigonometric functions and exponential function with derivative and integral [12 hrs.] 2. Application of exponential and logarithimic function. [8 hrs.] 3. Hyperbolic Trigonometric function and inverse Hyperbolic Trigonometric function with derivative and integral. Methods of integral. [16 hrs.] 4. Methods of integral Integration by part, Integration by Trigonometric subistitutation and completing squares, Integration by partial fractional, Integration involving, Integration by linear root contain 1st degree expressions and Integration by fractional function contains sine and cosine, Integration by odd and even and high power for trigonometric functions. [24 hrs.]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students The usual theoretical presentation method using the writing board and depending on the method (how and why) of the subject and according to the curriculum of the subject.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem)	**150**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4 and 14	LO #1, and #13
	Assignments	6	10% (10)	3,5,7,12,13 and 15	LO #1, #2,#3#4,#5and #6
	Projects / Tutorial	1	10% (10)	Continuous	All
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	10	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1-4	Transcendental function: logarithimic function , inverse Trigonometric functions and exponential function with derivative and integral. **(Quiz1)**
Week 5-8	Hyperbolic Trigonometric function and inverse Hyperbolic Trigonometric function with derivative and integral.
Week 9-15	Methods of integral: Integration by part, Integration by Trigonometric subistitutation and completing squares, Integration by partial fractional, Integration involving, Integration by linear root contain 1st degree expressions and Integration by fractional function contains sine and cosine, Integration by odd and even and high power for trigonometric functions . **(Mid Exam)**
Week 16	Preparatory week before the final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus I By: Thomas	Yes
Recommended Texts	Calculus I By: Thomas 2018	No
Websites	https://www.coursera.org/search?query=Calculus	

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	HUMAN RIGHTS AND DEMOCRACY			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOM104				
ECTS Credits	4				
SWL (hr/sem)	60				
Module Level		2	**Semester of Delivery**		1
Administering Department		Petroleum Engineering	**College**	Engineering college	
Module Leader	Basma Mohamed Natheer Ahmed		**e-mail**	Bsmam2022@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		10/09/2024	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	**Introducing the subject of the history and development of international relations from the Middle Ages to the end of the twentieth century, as well as clarification**

	And interpreting the most important international and modern problems and issues that af and are affected by international relations, in order to bring the student to a high degree of political, intellectual and historical awareness to analyze the events and developments tl occur in the world in this era. Modern and contemporary and try to judge them objectively.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course, students will be able to: A Knowledge and understanding 1 - The ability to understand what is right and human rights 2. The ability to differentiate between human rights in a way that is consistent with reality 3.The ability to understand the relationship between human rights and political science 4. The ability to provide appropriate advice A - The ability to identify and solve problems B -Subject-specific skills 1. - The ability to know the mechanism of political participation 2 - The ability to link theoretical study to practical reality
Indicative Contents المحتويات الإرشادية	This course is a "must have" for anyone working with the subsurface within the life application. Students will understand and employ the scientific method of inquiry to draw conclusions based on verifiable evidence. Students will explain the impact of scientific theories, discoveries, or technological changes on society. Students will demonstrate critical thinking skills in the analysis of scientific data. understand that real data can be uncertain and that one has to use common sense and understanding in order to find good answers to the interpretation problems.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Teaching/Learning Strategies include: 1- Direct Instruction in classroom, 3 hrs per week+ 1 hr per week tutorial. 2- Classroom Discussions 3- tests, quizzes, class participation, projects, homework assignments, presentations. Methods of assessment for students. 1- Compulsory exercises

	2- Quarterly exams. 3- Discussions and assignments for project. *The overall assessment for this course is as follows: Annual pursuit of 50 points from the total mark, which includes assignments, oral examinations and quarterly in addition to presentations. *50 marks for the final exam

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	None	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Concept and History of Democracy-Features and components of a democratic system-Constitution and democracy Elections
Week 2,3	Civil Society Organisations and Democracy -The relationship between human rights and democracy Genocide Crimes- Guarantees of public freedoms and rights
Week 4,5	Conditions of democracy-Good governance-Political participation -Elections and their characteristics Political pluralism
Week 6,7	Citizenship and its components-General concepts of democracy-A general introduction to the concept of human rights -The roots of human rights and their development in human history

Week 8, 9, 10, 11	The evolution of the idea of protecting human rights in the modern era-The international community and contemporary human rights-Human rights at the regional level-Human rights at the international level United Nations Mechanisms for the Protection of Human Rights-Human duties and restrictions on the exercise of human rights
Week 12, 13,14	International organisations and bodies involved in the defence of human rights-Professional ethics- Student Discipline Law in Higher Education Institutions-Human Rights Concepts
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Required textbooks (curricular books, if any)	Yes
	Main references (sources)	
Recommended Texts	Recommended books and references (scientific journals, reports...)	Yes
Websites	Electronic References, 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 II**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒**Lab** ☐**Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**UOM2032**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zahraa Ghanim Younis Al-alaf		**e-mail**	E-mail; zahraaalmajidi@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/09/2024		**Version Number**	2.0	

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 Objectives أهداف المادة الدراسية	Teaching the student to recognize the basic rules for dealing with and managing the MATLAB to help him achieve Completion of software projects and numerical analysis &Design & simulation and modeling The student learns the methods and skills of scientific research
Module Learning Outcomes	A- Cognitive goals

مخرجات التعلم للمادة الدراسية	1-The student's comprehension of the material is the ability to analyze and apply what he learned practically on the MATLAB 2-That the evaluation is done by presenting the material to the students in the laboratory and then applying what they learned from them 3-Software knowledge 4-Knowledge of creating programs analysis 5- Knowledge of simulation and modeling in future B- The soft skills objectives of the course 1-Turn on the MATLAB 2- Learn the skill of write code in MATALAB 3- Recalling data from other programs as input into MATLAB c- AI in MATLAB.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Learning the MATLAB program is characterized by several objectives related to study and personal development. Here are some of the main objectives of studying MATLAB Flow Charts, Input and output instructions& Represents Equ. According to its priority + Build in MATLAB functions. [6 hr] 2- MATLAB provides a powerful development environment for writing and testing algorithms. You can perform many complex operations such as Truth tables and (simple/complex) conditions ,Control statements : if statements with examples & Control statements : if else statements with examples.[10hr] 3- MATLAB supports programming with its own scripting language called MATLAB Script, in addition to the possibility of using it as a programming editor. You can use MATLAB to develop scientific applications and complex mathematical solutions. Such as Nested if with examples and its flow chart Control statements : switch...case statement ,Examples : Switch... case with its flow chart, Concept of counter and accumulater &Loop statements: for instruction. [8hr] 4-Introduction to AI: Definition of AI, History of AI,AI techniques and approaches, Challenges and ethical consideration. [3hr] 5-Applications AI: education, healthcare, finance, transportation , marketing and advertising .[3hr]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	100	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	50	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Tutorial	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Flow Charts
Week 2	Input and output instructions

Week 3	Represents Equ. According to its priority + Build in MATLAB functions
Week 4	Truth tables and (simple/complex) conditions
Week 5	Control statements : if statements with examples
Week 6	Control statements : if else statements with examples
Week 7	Nested if with examples and its flow chart
Week 8	Control statements : switch...case statement- Examples : Switch... case with its flow chart
Week 9	Concept of counter and accumulater
Week 10	Loop statements: for instruction- Examples : for stat. with its flow chart
Week 11	Introduction to Al: Definition of Al, History of Al, Al Techniques and Approaches, Challenges and Ethical Considerations.
Week 12	Al in Our Daily Lives: Al in smartphones and virtual assistants like Siri or Google Assistant.)
Week 13	Applications of Al: Education, Healthcare, Finance, Transportation, Marketing and Advertising
Week 14	Al and Society: (How Al affects social, Al and international relations, Al and the future of humanity.)
Week 15	-Ethical Challenges in Al (Al ethics, privacy and surveillance, the impact of Al on the job market.) -The Future of Al (Future trends in Al, recent research and emerging technologies.)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab 1:** Computer application basics of using the MATLAB program
Week 2	Lab 2: Computer application for **Input and output instructions**
Week 3	Lab 3: Computer application for Represents Equ. According to its priority + Build in MATLAB functions
Week 4	Lab 4: Truth tables and (simple/complex) conditions
Week 5	Lab 5: **Control statements : if statements with examples s**
Week 6	Lab 6: Control statements : if else statements with examples
Week 7	Lab 7: **Nested if with examples and its flow chart**
Week 8	Lab 8: **Mid Exam**
Week 9	Lab 9: **Examples :** Write some cods by using M-file
Week 10	Lab 10: **Concept of counter and accumulater**
Week 11	Lab 11: **AI – seminar**
Week 12	Lab 12: **AI – seminar**
Week 13	Lab 13: **GUI : Neural net work in MATLAB**
Week 14	Lab 14: **Examples: Neural net work in MATLAB**
Week 15	Lab 15: **Examples: Neural net work in MATLAB**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Programing Fundamentals Using MaT LAB Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", Ist Edition (2024).	Yes
Recommended Texts	” in Proceedings of the 2008 International Conference on Digital Government Research	No
Websites	https://www.mathworks.com/products/matlab.html	

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 1**			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐**Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE211**				
ECTS Credits	6				
SWL (hr/sem)					
Module Level	2		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Salahaldeen Thanoon		**e-mail**	Zeadsalahaldeen@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/09/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	11. Provide the fundamental base for mathematics for functions. 12. Use mathematical differentiation and integration to solve some engineering problems.
Module Learning Outcomes	1. Find the derivative of the functions that have two and three variables. 2. find the area and volume by using the integral.

مخرجات التعلم للمادة الدراسية	3. Using integral and derivative to solve some physical problems. 4. Knowing the hypobaric functions. 5. Solve the engineering problem by Catenary.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1 Partial Derivative. Second Order and Higher Order Partial Derivative, Chain Rule, Total Derivative. [20 hrs] Chapter 2 Introduction to Multiple Integration Multiple Integrals, Double and Triple. [20 hrs] Chapter 3 Hyperbolic Functions. Identities of Hyperbolic Functions. Graphs of Hyperbolic Functions. Derivative and Integral of hyperbolic Functions Graphs of Inverse Hyperbolic Functions. Identities of Inverse Hyperbolic Functions. Derivative of Inverse Hyperbolic Functions. The integral of Inverse Hyperbolic Functions. Relationship between Inverse Hyperbolic Functions and Logarithm Formula. [10 hrs] Chapter 4 Application of Hyperbolic Functions: Catenary [10 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٨7	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	٦
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 and 10	LO #1, #2 and #٩, #١٠
	Assignments	2	10% (10)	2 and 12	LO #١, #4
	Projects / Tutorial				
	Report				
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	LO #1 - #٤
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Partial Derivative

Week 2	Second Order Derivative
Week 3	Chain Rule
Week 4	Maximum and Minimum & Saddle Point
Week 5	Lagrange Multipliers
Week 6	Introduction to Multiple Integration
Week 7	Multiple Integrals, Double and Iterated Integrals over Rectangles
Week 8	Double Integrals over General Regions, Area by Double Integration
Week 9	Double Integrals in Polar Form
Week 10	Moments and Centers of Mass.
Week 11	Introduction to Hyperbolic Functions. Identities of Hyperbolic Functions. Graphs of Hyperbolic Functions
Week 12	Derivative and Integral of hyperbolic Functions Graphs of Inverse Hyperbolic Functions. Identities of Inverse Hyperbolic Functions
Week 13	Derivative of Inverse Hyperbolic Functions. The integral of Inverse Hyperbolic Functions. Relationship between Inverse Hyperbolic Functions and Logarithm Formula
Week 14	Application of Hyperbolic Functions: Catenary
Week 15	Solve engineering problem abut catenary
Week 16	**The final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus by Finney and Thomas	Yes
Recommended Texts		No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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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	Fluid Flow I			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PRE212				
ECTS Credits	٥				
SWL (hr/sem)	١٢٥				
Module Level		2	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	**Raqeeb Hummadi Rajab**		**e-mail**	raqeeb.hummadi@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant professor	**Module Leader's Qualification**		M.Sc.
Module Tutor	**Ghufran Faria Abdullah alrahhawi**		**e-mail**	**Ghufranalrahhawi.uomosul.edu.iq**	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		25/9/2024	**Version Number**	2	

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	Students will be able to: 1. Classify the fluid properties (compressibility, elasticity, viscosity, surface tension, capillarity).

	2. Measure pressure by all types of manometers. 3. Calculate the forces on the(buoyant) immersed bodies and surfaces. 4. Analyze the fluid when subjected to Rotation & linear acceleration.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and apply the fundamentals of fluid mechanics. 2. State, explain, and apply fluid mechanics equations. 3. Understand fundamentals of dynamics, work and energy, and gravitation and central force motion. 4. Understand and apply the basic idea of work-energy theorem to physical systems. 5. Apply the principle of conservation of mechanical energy to solve simple problems in mechanics. 6. Calculate the pressure and density of fluid at different depth. 7. Explain the Hydrostatic Pressure. 8. Explain Pascal's principle and the operation of a hydraulic lift. 9. Define and describe the buoyant forces and Archimedes' principle, furthermore, weighing an object immersed in a fluid.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Basic Quantities, including** - Basic concepts of fluid mechanics, fundamental terms. - State SI units, and write the units and their abbreviations correctly. - Distinguish between fluid, their properties. - Define, calculate, and distinguish between viscosity, compressibility, surface tension and capillarity. - Explanation of pressure gauges, their types and applications **Pressure Measurement** - Pressure Variation in Static Fluids - Pressure head of a liquid - Pascal's Law - Variation of pressure vertically in fluid under gravity **Hydrostatic force and their application** - State, explain, and apply hydrostatic forces. - Differentiate between immersed gates and their applications. - Calculate the magnitude and center of forces on plane surfaces. - Calculate the magnitude and center of forces on inclined plane surfaces. - Calculate the magnitude and center of forces on curved surfaces. **Buoyancy and Floatation** - Buoyancy - Archimedes' principle - Types of Equilibrium of Floating Bodies **Pressure variation through an accelerated mass of fluid** - Vertical motion - Horizontal motion - Combined horizontal and vertical acceleration

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٦٢	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	١٢٥		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	5	10% (10)	Continuous	All
	Report	4	5% (5)	3,5,7 and 9	LO # 1, 2,5 and 6
Summative assessment	**Midterm Exam**	1.5hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**An introduction to the fundamental of fluid mechanics, basic concepts and units system**
Week 2	**Physical properties of fluids (compressibility, elasticity, surface tension)**
Week 3	**Physical properties of fluids (capillarity, vapor pressure , viscosity)**
Week 4	**Fluid pressure at static.**
Week 5	**Pressure**
Week 6	**applications and measurements.**
Week 7	**applications and measurements.**
Week 8	**Forces on immersed bodies – vertical plane surfaces**
Week 9	**Forces on immersed bodies – inclined plane surfaces**
Week 10	**Forces on immersed bodies – curved surfaces**
Week 11	**Forces on immersed bodies – curved surfaces**
Week 12	**Buoyant forces, stability of floating and submerged bodies, metacentric height.**
Week 13	**Buoyant forces, stability of floating and submerged bodies, metacentric height.**
Week 14	**Buoyant forces, stability of floating and submerged bodies, metacentric height.**
Week 15	**Pressure variation through an accelerated mass of fluid**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab 1: How to write reports and draw curves**
Week 2-3	**Lab 2: Determination Center of Pressure on a Submerged Plane Surface**
Week 4-5	**Lab 3:Measurement Impact of Jet on Plate**
Week 6-7	**Lab 4:Determining Reynolds Number in Pipes**
Week 8-9	**Lab 5: Proofing of Bernoulli Equation**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ Elementary Fluid Mechanics Vennard and Street. 6thedition, 1982. ➢ Fluid Mechanics 5th edition Frank M. White. 1999. ➢ Hydraulics experiments, Saad Allah.M, Ramadan.M.,1978	~~Yes~~
Recommended Texts	➢ Bruce R. Munson, Donald F. Young and Theodore H. Okiishi, 2002. "Fundamentals of Fluid Mechanics"	~~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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**Material engineering and Corrosion**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE216**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	II		**Semester of Delivery**	1	
Administering Department	PGR		**College**	PME	
Module Leader	Dr. Ahmad Abdulsalam Aabid		**e-mail**	ahmadchemical1991@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name:		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/09/2024		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Provide the students the engineering material specification, properties, processing, and testing as well as corrosion, its types, and how to prevent.
Module Learning Outcomes	**1. Ability to deal with mechanical, physical, and chemical properties of engineering materials, such as metals, ceramics, polymers, and composites.** **2. Ability to predict and control material properties through an understanding of atomic, molecular, crystalline, and microscopic structures of engineering**

مخرجات التعلم للمادة الدراسية	materials. 3. Ability to synthesis and processing of advanced materials for manufacturing. 4. Ability for choosing the suitable material in designing chemical vessels. 5. Ability to understand the relation between properties and structure. 6. Prepares students to apply their understanding of the processing, application, and sustainable use of engineering materials to the realization of new ideas coming from engineers, scientists, enterprises, and society. 7. Ability to understand how corrosion happens, its types, and how to prevent it.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following:** 1. Introduction to basic material: Basic atom structure and bonding [2 hrs]. 2. Crystal structure, geometry and space lattices [3 hrs]. 3. Imperfection and defects [3 hrs]. 4. Diffusion [3 hrs]. 5. Mechanical properties of material and types of mechanical testing [3 hrs]. 6. Phase diagram and transformation [4 hrs]. 7. Metal and alloy system (types, processing, and applications) [3 hrs]. 8. Polymer and rubber systems (types, processing, and applications) [4 hrs]. 9. Composite system (types, processing, and applications) [3 hrs]. 10. Ceramic and Refractory (types, processing, and applications) [3 hrs]. 11. Corrosion: Degradation of materials and prevention [12 hrs].
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The students will be actively engaged in the tasks, which will help them develop and hone their critical thinking abilities. This will be accomplished via lectures, interactive tutorials, and assignments incorporating fascinating tasks. The course includes: 1- Numerous examples worked out in detail to illustrate the basic principles. 2- A consistent strategy for problem solving that can be applied to any problem. 3- Figures, sketches, and diagrams to provide a detailed description and reinforcement of what you read. 4- Self-Assessment Tests at the end of each section, with answers so that you can evaluate your progress in learning.

	5- Many problems will be discussed and solved in the classes and tutorials, which offer working with one or more classmates to exchange ideas and discuss the material.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	4 and 12	LO #3, #4 and #6, #7
	Seminar	1	5% (5)	9	All
	Report	1	5% (5)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	14	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
Week 2	Crystal structure, geometry, and space lattices
Week 3	Imperfection and defects
Week 4	Diffusion
Week 5	Mechanical properties of material
Week 6	Phase diagram and transformation
Week 7	Metal and alloy system
Week 8	Polymer and rubber systems
Week 9	Composite system
Week 10	Ceramic and Refractory
Week 11	Corrosion Principles
Week 12	Electrochemical Aspect of corrosion
Week 13	Thermodynamic Aspect of Corrosion
Week 14	Corrosion Forms
Week 15	**Preparatory week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	3- Fundamentals of Materials Science and Engineering, W. D. Callister and D. G. Rethwisch, 4th ed., 2018.	Yes
Recommended Texts	1. An Introduction to Material Engineering and Science: For chemical and material engineers, Brian S. Mitchell, 1st ed., 2003. 2. Material Science and Engineering: An introduction, W. D. Callister and D. G. Rethwisch, 10th ed., 2018. 3. Material science S.L, Kakani and A. Kakani, 1st ed., 2017.	No
Websites	https://onlinelibrary.wiley.com/journal/15214176 https://www.unsw.edu.au/science/our-schools/materials/engage-with-us/high-school-students-and-teachers/online-tutorials/corrosion	

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	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE213**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	II		**Semester of Delivery**	1	
Administering Department	**Dept. of Petroleum & Refining Eng.**		**College**	**College of Petroleum and Mining Eng.**	
Module Leader	**Asst. Prof. Raqeeb H. Rajab**		**e-mail**	raqeeb.hummadi@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Sarah Saad Abduljabbar		**e-mail**	sarahsaad3860707@uomosul.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/09/2024		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 1. Identify the terminology and definitions associated with thermodynamics, review unit system, properties of a system such as density, pressure, temperature and specific heats. 2. Introduce a systematic steps for solving thermodynamic problems. 3. Understand the concept of energy and the definition of its various types, especially, internal energy of a system. 4. Understand the concept of heat and the way energy transfer by heat. 5. Define the concept of work.

	6. Introduce the first law of thermodynamics and energy balance. 7. Define a control volume principle, including the transfer of mass and energy crossing the control surface. 8. Understand the concept of a pure substance, phase change, and projection of substance property line on PV, TV, and PT property diagram. 9. Demonstrate the procedures for determining thermodynamic properties of pure substances from tables of property data. 10. Define the hypothetical ideal gas, and demonstrate the ideal-gas equation of state as well as the deviation from ideal gas behavior through compressibility factor. 11. Apply the first law of thermodynamics on closed (fixed mass) system and develop the general energy balance applied to closed systems. 12. Define the specific heats at constant volume and pressure and relate them to the changes in internal energy and enthalpy of ideal gases. Also, determine the internal energy and enthalpy for incompressible substances. 13. Apply energy balance for closed (fixed-mass) systems that involve heat and work interactions for pure substances, ideal gases, and incompressible substances. 14. Apply mass conservation principle to various systems including steady and unsteady flow control volumes. 15. Identify the energy carried by a flow stream crossing a control surface as the sum of internal energy, flow work, kinetic energy, and potential energy of the fluid and to relate the combination of the internal energy and the flow work to the property enthalpy. 16. Solve energy balance problems for common steady-flow devices such as nozzles, compressors, turbines, throttling valves, mixing chambers, and heat exchangers. 17. Define and thermal energy reservoirs, reversible and irreversible processes, and introduce the heat engines, refrigerators, and heat pumps. 18. Apply the second law of thermodynamics to theoretical cycles and develop absolute thermodynamic temperature scale.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Intellectual Skills: 1. Apply thermodynamic principles and mathematical techniques to analyze and solve problems related to energy, heat, and work. 2. Analyze and interpret thermodynamic diagrams, property tables, and equations of state. 3. Evaluate and compare the performance of different thermodynamic processes and cycles. 4. Apply thermodynamic concepts and principles to analyze and design engineering systems and real-world applications.
Indicative Contents المحتويات الإرشادية	Module Contents: **1. Introduction to Thermodynamics [8 hr]** - Basic concepts and definitions - System, surroundings, and boundaries - State and properties of a system - Processes and cycles - Energy, Heat, and Work **2. Forms of energy [8 hr]** - First Law of Thermodynamics - Type of energy **3. Pure substances and mixtures [12 hr]** - Property diagrams and tables - Equations of state - Phase equilibrium

	4. Gas laws and equations [12 hr] - Ideal Gas Behavior - Ideal gas processes - Specific heat capacities - Real gas behavior **5. First Law of Thermodynamic and Energy Balance [20 hr]** - Entropy and irreversibility - Carnot cycle and efficiency - Thermodynamic Processes and Cycles **6. Isobaric, isochoric, isothermal, and adiabatic processes [15 hr]** - Rankine cycles - Vapor compression refrigeration cycle **7. Energy balance of open system [20 hr]** - Power generation systems - Refrigeration and air conditioning systems - Thermal energy storage - Combustion and energy conversion

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)
الحمل الدراسي للطالب

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1, 2, 4
	Assignments	4	10% (10)	2, 12	LO # 3, 4
	Projects / Lab.	1	10% (0)	continues	All
	Report	1	10% (5)	continues	All

Summative assessment	**Midterm Exam**	1hr	10% (15)	8	LO # 1,2
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, concept, and definitions
Week 2	Energy, heat, work,
Week 3	First law of thermodynamics
Week 4	Properties of pure substances, property tables
Week 5	Ideal Gases, real gases, compressibility ratio.
Week 6	Energy analysis of a closed system
Week 7	Energy analysis of a closed system
Week 8	Isobaric and Isochoric Process
Week 9	Isothermal process
Week 10	Adiabatic and polytropic processes
Week 11	Mass and energy analysis of control volume
Week 12	Steady- and unsteady flow, energy balance
Week 13	Nozzles, compressors, turbines
Week 14	Throttling valves, mixing chambers, and heat exchangers
Week 15	Introduction to second law of thermodynamic
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Yunus A. Cengel and Michael A. Boles. Thermodynamics: An Engineering Approach, 7th Ed. McGraw Hill, 2011.	Yes
Recommended Texts	1. Borgnakke, C. and Sonntag, R. E., Fundamentals of Thermodynamics, 7th Ed., John Wiley & Sons, 2009. 2. Moran, M.J., and Shapiro, H.N., Fundamental of Engineering Thermodynamics, 5th Ed., John Wiley &	PDF

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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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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 Chemistry**			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE215**				
ECTS Credits	6				
SWL (hr/sem)	١٥٠				
Module Level	II		**Semester of Delivery**	1	
Administering Department	PGR		**College**	PPE	
Module Leader	Semaa I. Khaleel		**e-mail**	semaaibraheem@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	N/A		**e-mail**	E-mail N/A	
Peer Reviewer Name	Name -		**e-mail**	E-mail -	
Scientific Committee Approval Date	25/09/2024		**Version Number**	2.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To study the chemical composition of crude oil 2. To study the classification of crude oil based on API, Kw, VGC, paraffin & sulfur content, and correlation index method.

	3. To study the chemical composition and physical properties of petroleum products and natural gas. 4. To study the type of distillation curves of crude oil and petroleum products.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. knowing the PIONA, sulfur, nitrogen, and oxygen compounds present in crude oil. 2. Knowing the light, medium, heavy, paraffinic, naphthenic, aromatic base crude oils 3. Have basic knowledge about how crude oil can be fractionated into final products. 4. Knowing the main components of NG and LPG with their physical properties. 5. Knowing the PNA composition of Naphtha with carbon and boiling point range. 6. Knowing the PNA composition of Gasoline, RON&MON, RVP, copper strip test. 7. Knowing the PNA composition of kerosene, Flash, Smoke, Aniline points. 8. Knowing the PNA composition of AGO, DI, sulfur and nitrogen content, viscosity and CFP. 9. Knowing the PNA composition of fuel oil and lubricating oils properties. 10. Knowing the PNA composition of AR, VR and Bitumen properties. 11. Knowing the API, ASTM d86, and ASTM D1160 curves. 12. Knowing the TBP, EVF, and SD curves for crude oil and petroleum products.
Indicative Contents المحتويات الإرشادية	Part A: Definition of crude oil and studying its chemical and elemental composition, hydrocarbon and non-hydrocarbon constituents, and SNO content [12 hr.]. Part B: The basic concept of ADU and VDU of crude oil [4 hr.]. Part C: Study the chemical and physical properties of petroleum products [20 hr.] Part D: API gravity and distillation curves of petroleum products [20 hr.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to motivate students' participation in the class by raising questions and inquiries while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, symposiums, simple experiments that are interesting to the students, and self-assessment tests.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
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	20% (20)	5 and 10	#1 - #5 and #6- #10
	Assignments	2	4% (4)	4 and 13	#1- #4 and #5- #12
	Lab assignments	2	6% (6)	7 and 14	All
	Lab Report	5	10% (10)	2,3,6,8, 10	#5, and #6- #12
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	#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	The chemical composition of crude oil.
Week 2	The hydrocarbon and non-hydrocarbon constituents of crude oil.

Week 3	The classification of crude oil.
Week 4	The technological classification of crude oil.
Week 5	The atmospheric and vacuum distillation of crude oil.
Week 6	The chemical and physical properties of natural gas and LPG.
Week 7	The chemical and physical properties of total naphtha.
Week 8	The chemical and physical properties of gasoline.
Week 9	The chemical and physical properties of kerosene.
Week 10	The chemical and physical properties of atmospheric gas oil.
Week 11	The chemical and physical properties of fuel oil.
Week 12	The chemical and physical properties of AR and VR and petroleum coke.
Week 13	The API gravity and distillation curves of crude oil and petroleum products.
Week 14	The API gravity and distillation curves of crude oil and petroleum products.
Week 15	Preparatory week
Week 16	final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to laboratory of petroleum chemistry

Week 2	Lab 2: Determining the API gravities of crude oils
Week 3	Lab 3: Determining the API gravities, Specific gravities, and relative densities of petroleum products .
Week 4	Lab 4: Determining the PNA composition of Gasoline by gas chromatography
Week 5	Lab 5: Determining the PNA composition of kerosene by gas chromatography
Week 6	Lab 6: Determining the PNA composition of light gasoil by gas chromatography
Week 7	Lab 7: ASTM D86 distillation curves of light and middle distillates .
Week 8	Lab 8: ASTM D1160 distillation curves of heavy distillates
Week 9	Lab 9: TBP experiment for crude oil
Week 10	Lab 10: EFV experiment for crude oil and light distillates
Week 11	Lab 11: Acid value (PH)of petroleum products Asphalt properties and semi solid (bitumen) of petroleum crude.
Week 12	Lab 12: Standard test method for distillation of petroleum products at atmospheric pressure ASTM D86, IP 123
Week 13	**Preparatory week**
Week 14	**Preparatory week**
Week 15	**final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Characterization of petroleum products by Riazi 2. Handbook of Petroleum Refining Processes by Meyers	Yes
Recommended Texts		No
Websites	https://www.sciencedirect.com/book/9780444527851/fundamentals-of-petroleum-refining	

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			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PRE2022				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	**Semester of Delivery**		٢
Administering Department		Petroleum Reservoir Engineering Department	**College**	Petroleum and mining engineering college	
Module Leader	Amira Rifae Hannawi		**e-mail**	amira.rifae@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	**Module Leader's Qualification**		Msc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		25/09/2024	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	13. to enable the learner to communicate effectively and appropriately in real life situation. 14. to use English effectively for study purpose across the curriculum. 15. to develop interest in and appreciation of language 16. to develop and integrate the use of the language skills i.e. Reading, Speaking and Writing . 17. to revise and reinforce structure and grammar already learnt.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 7. Define The ability to read English with understanding the student is able to understand the total content 8. Identify the ability to understand English when it is spoken. 9. Promote the ability to write English correctly . 10. Outline the correct usage of the grammatical items. 11. Describing and Identify some concepts of petroleum and mining study to enhance students' lexicon of specific terms . 12. List students' weaknesses in an attempt to strengthen and overcome them 13. Encourage student to write reports about different topics . 14. Enforce their language by giving them assignment that strengthen the method of research and writing
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. types of sentences An affirmative sentence (a declarative or assertive) sentence, and it can be either a simple, complex or compound sentence as long as it is positive , Negative and interrogative sentences . [15hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	The main strategy that will be adopted in delivering English language is to encourage students' participation in the exercises, discussion and use brainstorming by asking many questions to keep in touch with the students .In this course we will also encourage students how to write , read and discuss different scientific topics . while at the same time refining and expanding their critical thinking skills and give and receive feedback from the students. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6 and 12	LO #3 #4and #6
	Assignments	2	10% (10)	2 and 12	LO #1 #2 and #5 #8
	Report	1	10% (10)	13	LO #1#2 and #4 #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	All
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Simple sentence + reading and listening scientific passage
Week 2	Compound sentence + reading and listening scientific passage
Week 3	Complex sentence + reading and listening scientific passage
Week 4	Affirmative sentence (declarative or assertive) + reading and translating scientific passage
Week 5	Negative, positive and interrogative sentences + reading and listening scientific passage
Week 6	Examination
Week 7	Numbers and Measurement + reading and translating scientific passage
Week 8	Describing Equipment + reading and translating scientific passage
Week 9	Giving Instructions + reading and translating scientific passage
Week 10	Safety + reading and translating scientific passage
Week 11	Describing Systems + reading and translating scientific passage
Week 12	Making Comparisons + reading and translating scientific passage
Week 13	Describing Processes + reading and translating scientific passage
Week 14	Expressing Possibility + reading and translating scientific passage
Week 15	Countable/uncountable nouns How much/how many + reading and translating scientific passage
Week 16	**Preparatory week before the final Exam**

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

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Levrai. P (2020) English for Oil and Gas FOUNDATION COURSE .TTLINTERNATIONAL Frendo.E with Bonamy, D(1997) English for the Oil industry , PEARSON LONGMAN .	No
Recommended Texts	Textbook and curriculums approved by the scientific committee and academic accreditation committee .	No
Websites	https://academicguides.waldenu.edu/writingcenter/scholarlyvoice/sentencestructure https://byjus.com/english/types-of-sentences/	

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 II**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**UOM2012**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	**Dept. of Petroleum & Refining Eng.**		**College**	**College of Petroleum and Mining Eng.**	
Module Leader	**Arwa Issa Mohammed**		**e-mail**	arwa.issa.m@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/1/2025		**Version Number**	2.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this semester is to enable students to read correctly and acquire the ability to use language correctly in communication with others, such as speed, quality of delivery, and eloquence. It also aims to teach students to listen well, develop their literary taste, and accustom them to correct, clear expressions.
Module Learning Outcomes	CLO1: Introducing the student to the necessity of practicing the rules of writing and speaking in classical Arabic.

مخرجات التعلم للمادة الدراسية	CLO2: Introducing the student to the levels of the Arabic language system CLO3: Deepening the student's connection with the Arab and Islamic heritage. CLO4: Promote scientific research in the field of Arabic language and its sciences to prepare studies and research. CLO5: Showing the beauty of the Arabic language, the breadth of its meanings and its constructional styles. CLO6: Enabling the student to overcome and correct linguistic errors. CLO7: Developing the student's literary taste to understand the aesthetic aspects of speech style, images and meanings. CLO8: Introducing the most prominent poets of the Abbasid era
Indicative Contents المحتويات الإرشادية	Part One: (6 hours) • Arabic Grammar (Syntax) • Subject and Predicate • Subject and Predicate Rejectors Part Two: (6 hours) • Kana and its Sisters • In and its Sisters Zan and its Sisters Part Three: (6 hours) • Midterm Exam • Accusative Nouns • Absolute Object Part Four: (4 hours) • Grammatical Mistakes • Spelling Part Five: (8 hours) • Literature in the Abbasid Era • The Poet Al-Mutanabbi • The Poet Abu Tammam • The Poet Abu Firas Al-Hamdani

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The primary goal of Arabic language lessons is to eliminate the difficulty and rigidity that may accompany some of the topics covered in these lessons, in addition to conveying the required ideas and information to students in ways that are understandable and appropriate to their individual differences. The most prominent focus of the lectures is Arabic grammar and literature. The study consists of lectures, exams, in-class assignments, discussions, and homework.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1.1

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	4,8 and 10	All
	Assignments	1	10% (10)	6	CLO4, CLO5, and CLO6
	Projects / Lab.	1	10% (10)	12	All
	Report	1	10% (10)	10	CLO4, CLO5, and CLO6
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	7	All
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	importance of Arabic Grammar (Grammar)
Week 2	Subject and Predicate
Week 3	Subject and Predicate Rejectors
Week 4	Kana and its Sisters
Week 5	Inna and its Sisters
Week 6	Zanna and its Sisters
Week 7	Midterm Exam
Week 8	Accidental Nouns
Week 9	Absolute Object
Week 10	Linguistic Mistakes
Week 11	Spelling
Week 12	Literature in the Abbasid Era
Week 13	The Poet Al-Mutanabbi
Week 14	The Poet Abu Tammam
Week 15	The Poet Abu Firas Al-Hamdani
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Comprehensive Grammar / Abbas Hassan	Yes
Recommended Texts	In Abbasid Literature / Muhammad Mahdi Al-Basir	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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	Electrical technology			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PRE227				
ECTS Credits	6.00				
SWL (hr/sem)	150				
Module Level		UGI	**Semester of Delivery**		Two
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Abdullah Hussein Ibrahem		**e-mail**	abdallh.hussen@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		PhD
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date		20/01/2024	**Version Number**		1.0

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

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

Module Objectives أهداف المادة الدراسية	1. The foundations of Identify the types of materials and their atomic and crystal structure (semiconductors for example). 2. Study of the physical properties of minerals (electrical properties). 3. This course deals with the basic concepts of metallic materials and methods of using them in electronic devices (diodes, transistors and logic gates). 4. To develop problem-solving skills and an understanding of circle theory through the application of techniques and physical laws. 5. To perform network and nodal analysis. 6. Fundamentals of electronic devices used in mining.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the basics of the crystalline and atomic structure of materials and how to distribute atoms and electrons. 2. Studying semiconducting materials by studying their electrical properties. Know how semiconductor materials are used in the manufacture of the basics of electronic devices. 3. Identify semiconductor devices such as diodes, transistors and logic gates. 4. Knowing the laws and applications of semiconductor devices. 5. Study how the devices work individually. 6. Studying how the devices work in the electronic circuit. 7. Recognize how electricity works in electrical circuits. 8. Discuss the reaction and involvement of devices in electric circuits. Studying the application of physical laws to circuits, such as Kirchhoff's law, Ohm's law, and others. 9. Learn how to deal with electronic devices (which are the basis for command and control systems).
Indicative Contents المحتويات الإرشادية	<u>Part A - Circuit Theory</u> crystal structures and crystallography – type of crystallography, type of solid materials, crystal structure, Lattice translation vectors, Unit cell, Crystal systems, Crystal symmetry, Crystal planes and indices. [9 hrs] Atomic structure - The Atom, Electron configuration of atom, the periodic table elements, Materials Used in Electronic Devices, Current in Semiconductors, *N*-Type and *P*-Type Semiconductors, The *PN* Junction. [9 hrs] <u>Part B - Analogue Electronics</u> Fundamentals Semiconductor devices, Kirchhoff's laws, Ohm's law, Analysis of a circuit. diodes and applications, Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, special diodes, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 hrs]

	Bipolar transistor and applications. [10 hrs] Field-effect transistors. [10 hrs] Part C - Digital Electronics Digital Fundamentals Number Systems, Operations, and Codes. Logic Gates. Boolean Algebra and Logic Simplification, Half and Full Adders, Latches, Flip-Flops, and Timers. [20 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**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 and 10	LO #1, #2 and #10, #11

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction in Solid State Physics - crystal structures and crystallography
Week 2	Atomic structure - The Atom, Materials Used in Electronic Devices
Week 3	Current in Semiconductors, *N*-Type and *P*-Type Semiconductors, The *PN* Junction
Week 4	Diodes and Applications , Special-Purpose Diodes
Week 5	Bipolar Junction Transistors (BJT)
Week 6	Transistor Bias Circuits
Week 7	BJT Amplifiers
Week 8	BJT Power Amplifiers
Week 9	Field-Effect Transistors (FETs)
Week 10	Number Systems, Operations, and Codes
Week 11	Logic Gates
Week 12	Boolean Algebra and Logic Simplification
Week 13	Combinational Logic Analysis
Week 14	Functions of Combinational Logic
Week 15	Latches, Flip-Flops, and Timers
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Characteristic of Silicon Diode
Week 2	Lab 2: Half and Full Wave Rectifier
Week 3	Lab 3: Characteristic of Zener Diode
Week 4	Lab 4: The Diode Properties of the Transistor and Its IV Characteristic Curves
Week 5	Lab 5: Logic gates
Week 6	Lab 6: Half adder and Full adder operations
Week 7	Lab 7: The Gray codes to binary circuit & binary to Gray codes circuit

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ELEMENTARY SOLID STATE PHYSICS: Principles and Applications, M. A. OMAR, Addison-Wesley Electronic Devices, Thomas L. Floyd, Tenth Edition Digital Fundamentals , Thomas L. Floyd, Eleventh Edition	No Yes No
Recommended Texts	فيزياء الحالة الصلبة , يحيى نوري الجمال, طبعة ثانية	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	**Engineering Mathematics II**			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PRE221				
1ECTS Credits	6				
SWL (hr/sem)					
Module Level	2		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Salahaldeen Thanoon		**e-mail**	Zeadsalahaldeen@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/01/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Provide the fundamental base for mathematics for functions. 2. Use mathematical differentiation and integration to solve some engineering problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	5. Know the three-dimensional coordinate system. 6. Find the dot and cross product and angle between vectors 7. Know the equation of lines and parametric equation of lines. 8. Solve the differential equations in first-order first-degree. 9. Solve linear differential equations in high order.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Three-Dimensional Coordinate Systems, The Distance Between two points, Vectors, Component Form, Vector Algebra Operations, Properties of Vector Operations, Midpoint of a Line Segment, The Dot Product, Angle Between Vectors [8 hrs] The Angle Between Two Nonzero Vectors u and v, Orthogonal Vectors, Dot Product Properties and Vector Projections. The Cross Product, The Cross Product of Two Vectors in Space, Parallel Vectors. [8 hrs] Properties of the Cross Product, Area of a Parallelogram, Calculating the Cross Product as a Determinant Lines and Planes in Space.Lines and Line Segments in Space. Parametric Equations for a Line, [8 hrs] The Distance from a Point to a Line in Space. An Equation for a Plane in Space, Equation for a Plane, Lines of Intersection, The Distance from a Point to a Plane, Angles Between Planes [4 hrs] Part B Differential Equations: Definition, Classification, order and degree of Des Homogeneity and linearity of the DEs, Generation of the DEs. Solution of DEs (First order First degree DEs by Separable method). Homogenous and non-homogenous DEs method). [8 hrs]

	Solution of DEs (First order First degree DEs by Linear and nonlinear method). Exact and non-exact method [8 hrs] Second order DEs for X-is missing, y-missing Solution of DEs (higher order DEs – Complementary solution + Particular solution). [16 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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	٢	30% (30)	5- 10	LO #1, 2, 3
	Assignments	٢	10% (10)	2-12	LO # 1-4
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	1 hr	10% (10)	8	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Three-Dimensional Coordinate, The Distance Between Vectors, m, Vector Algebra Operations, Properties of Vector Operations.
Week 2	The Dot Product, Angle Between Vectors. The Angle Between Two Non-Zero Vectors u and v, Orthogonal Vectors, Dot Product Properties and Vector Projections.
Week 3	The Cross Product, The Cross Product of Two Vectors in Space, Parallel Vectors Properties of the Cross Product, Area of a Parallelogram, Calculating the Cross Product as a Determinant
Week 4	Lines and Planes in Space. Line
Week 5	Vector Equation for a Line.
Week 6	Parametric Equations for a Line, The Distance from a Point to a Line in Space
Week 7	An Equation for a Plane in Space, Equation for a Plane, Lines of Intersection, The Distance from a Point to a Plane, Angles Between Planes
Week 8	Differential Equations: Definition, Classification, order and degree of
Week 9	DEs Homogeneity and linearity of the DEs, Generation of the DEs
Week 10	First order First degree DEs by Separable method

Week 11	First order First degree DEs by linear and nonlinear DEs method
Week 12	First order First degree DEs by Exact and non-Exact DEs method
Week 13	Second order DEs for X-is missing, y-missing
Week 14	higher order DEs – Complementary solution + Particular solution).
Week 15	higher order DEs – Complementary solution + Particular solution).
Week 16	**The final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Thomas' Calculus by Finney and Thomas.	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	English language II			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PRE 120				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		2	**Semester of Delivery**		٢
Administering Department		Petroleum Reservoir Engineering Department	**College**	Petroleum and mining engineering college	
Module Leader	Amira Rifae Hannawi		**e-mail**	amira.rifae@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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 Objectives أهداف المادة الدراسية	18. to enable the learner to communicate effectively and appropriately in real life situation. 19. to use English effectively for study purpose across the curriculum. 20. to develop interest in and appreciation of language 21. to develop and integrate the use of the language skills i.e. Reading, Speaking and Writing . 22. to revise and reinforce structure and grammar already learnt.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 15. Define The ability to read English with understanding the student is able to understand the total content 16. Identify the ability to understand English when it is spoken. 17. Promote the ability to write English correctly . 18. Outline the correct usage of the grammatical items. 19. Describing and Identify some concepts of petroleum and mining study to enhance students' lexicon of specific terms . 20. List students' weaknesses in an attempt to strengthen and overcome them 21. Encourage student to write reports about different topics . 22. Enforce their language by giving them assignment that strengthen the method of research and writing
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. types of sentences An affirmative sentence (a declarative or assertive) sentence, and it can be either a simple, complex or compound sentence as long as it is positive , Negative and interrogative sentences . [15hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering English language is to encourage students' participation in the exercises, discussion and use brainstorming by asking

	many questions to keep in touch with the students .In this course we will also encourage students how to write , read and discuss different scientific topics . while at the same time refining and expanding their critical thinking skills and give and receive feedback from the students. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6 and 12	LO #3 #4and #6
	Assignments	2	10% (10)	2 and 12	LO #1 #2 and #5 #8
	Report	1	10% (10)	13	LO #1#2 and #4 #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	All
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Simple sentence + reading and listening scientific passage
Week 2	Compound sentence + reading and listening scientific passage
Week 3	Complex sentence + reading and listening scientific passage
Week 4	Affirmative sentence (declarative or assertive) + reading and translating scientific passage
Week 5	Negative, positive and interrogative sentences + reading and listening scientific passage
Week 6	Examination
Week 7	Numbers and Measurement + reading and translating scientific passage
Week 8	Describing Equipment + reading and translating scientific passage
Week 9	Giving Instructions + reading and translating scientific passage
Week 10	Safety + reading and translating scientific passage
Week 11	Describing Systems + reading and translating scientific passage
Week 12	Making Comparisons + reading and translating scientific passage
Week 13	Describing Processes + reading and translating scientific passage
Week 14	Expressing Possibility + reading and translating scientific passage
Week 15	Countable/uncountable nouns How much/how many + reading and translating scientific passage
Week 16	**Preparatory week before the final Exam**

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

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Levrai. P (2020) English for Oil and Gas FOUNDATION COURSE .TTLINTERNATIONAL Frendo.E with Bonamy, D(1997) English for the Oil industry , PEARSON LONGMAN .	No
Recommended Texts	Textbook and curriculums approved by the scientific committee and academic accreditation committee .	No
Websites	https://academicguides.waldenu.edu/writingcenter/scholarlyvoice/sentencestructure https://byjus.com/english/types-of-sentences/	

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 II			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PRE222				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	**Raqeeb Hummadi Rajab**		**e-mail**	raqeeb.hummadi@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor	**Ghufran Faria Abdullah alrahhawi**		**e-mail**	**Ghufranalrahhawi.uomosul.edu.iq**	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/01/2025		**Version Number**	2	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fluid Mechanics I	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 1. Write clear physical and mathematical arguments including effective use of fluid equations. 2. Develop a solid understanding of the fundamental principles of fluid. 3. Use graphs and diagrams to convey results. 4. Decide on strategies to be used and assumptions that need to be made. 5. Use both algebraic and geometric approaches in problem-solving.

	6. Develop a flexible and creative problem-solving ability. 7. Develop an integrated understanding of the unity of fluid. 8. Develop their ability to communicate ideas of science. 9. Develop an expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply impulse-momentum principles and applications. 2. Demonstrate an understanding of ideal fluid flow. 3. Describe similitude and dimensional analysis. 4. Understand of basic viscous flows. 5. Understand of momentum-integral methods. 6. Calculate friction losses in pipes.
Indicative Contents المحتويات الإرشادية	This course provides and deals with different types of liquids at different temperatures and conditions, in addition to study the different equations that govern these fluids in static and moving conditions. The course has different subjects and topics which make the student have the enough understanding in thermal power field. The way in which they react to applied forces, accelerations, and the shear and normal stresses and strains set up within the fluids are all considered in an attempt to provide sufficient knowledge to the students to be able to work and design different equipment in fluids field. The study of fluid mechanics is the study of the behaviour of fluids (liquids and gasses) under static and dynamic conditions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**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)	4, 12	LO #1, 2, 10 and 11
	Assignments	1	10% (10)	6	LO # 3, 4, 6 and 7
	Projects / Lab.	10	10% (10)	Continuous	All
	Report	1	5% (5)	9	LO # 5, 8 and 10
Summative assessment	Midterm Exam	1.5hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fluid dynamics / classifications of fluids
Week 2	Introduction to fluid motion – basic concepts, Conservation of mass.
Week 3	Equations of motions- Euler's and Bernoulli's, Conservation of energy Work-Energy Equations, Momentum equation
Week 4	Impulse – momentum principles and applications.
Week 5	Flow in pipe, flow classification, Flow regimes and Reynlods number.
Week 6	Flow in pipe, turbulent flows and flow losses in pipes, Darcy equation.
Week 7	Friction losses in pipes, major and minor head losses in pipes and pipe fittings.
Week 8	Friction losses in pipes, major and minor head losses in pipes and pipe fittings.
Week 9	Flow of real fluids – basic concepts of external, internal, laminar and turbulent flow.
Week 10	Flow of real fluids – basic concepts of external, internal, laminar and turbulent flow.
Week 11	Pipe Line flow (Parallel, series, compound pipes, equivalent pipe).
Week 12	Pipe Line flow (Parallel, series, compound pipes, equivalent pipe).
Week 13	hydraulic and energy gradient lines.
Week 14	Similitude and dimensional analysis.
Week 15	Buckingham's Pi method for dimensional analysis.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	**Lab 1: Studying Flow Through orifice**
Week 3-4	**Lab 2: Using Venturi Meter for Determining Discharge in Pipes**
Week 5-6	**Lab 3: Determining Friction Factor in Pipes**
Week 7-8	**Lab 4: Using orifice plate for Determining Discharge in Pipes**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	➢ **Fluid Mechanics Fundamentals And Applications,** Çengel, Yunus A., 2006, Mcgraw-Hill Higher Education. ➢ **Fluid Mechanics,** Frank M. White., seventh edition, 2009, Mcgraw-Hill series in mechanical engineering.	~~Yes~~
Recommended Texts	➢ **Fluid Mechanics,** Russell Hibbeler. 2nd Edition, 2017.	~~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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE223**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level			**Semester of Delivery**		4
Administering Department	**Dept. of Petroleum & Refining Eng.**		**College**	**College of Petroleum and Mining Eng.**	
Module Leader	**Asst. Prof. Raqeeb H. Rajab**		**e-mail**	raqeeb.hummadi@uomosul.edu.iq	
Module Leader's Acad. Title	**Asst. Prof.**		**Module Leader's Qualification**		M.Sc.
Module Tutor	Name		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/1/2025		**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 19. Introduce Petroleum & Refining Engineeringstudents to the second law of thermodynamics and provide them examples from real engineering applications. Identify valid processes as those that satisfy both the first and second laws of thermodynamics. Reversible and irreversible process. 20. Apply the second law of thermodynamics to cycles and cyclic devices starting from idealized Carnot cycle including Carnot heat engines, refrigerators, and heat pumps. 21. Determine the expressions for the thermal efficiencies and coefficients of performance for reversible heat engines, heat pumps, and refrigerators. 22. Define entropy to quantify the second-law effects. Establish the increase of entropy principle and how to calculate the entropy changes that take place during processes for pure substances, incompressible substances, and ideal gases. 23. Derive the reversible steady-flow work relations. Develop the isentropic efficiencies for various steady-flow devices. Introduce and apply the entropy balance to various systems. 24. Introduce gas power cycles for which the working fluid remains a gas throughout the entire cycle. Analyze both closed and open gas power cycles. Solve problems based on the Otto, 25. Diesel, Brayton cycle. Brayton cycle with regeneration; and the Brayton cycle with intercooling, reheating, and regeneration. 26. Analyze vapor power cycles in which the working fluid is alternately vaporized and condensed.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course students would be able to: 1. Understanding the Second Law of Thermodynamics: Students should be able to comprehend and explain the fundamental principles and concepts associated with the Second Law of Thermodynamics, such as entropy, irreversibility, and the direction of natural processes. 2. Knowledge of Reversible and Irreversible Processes: Students should be able to differentiate between reversible and irreversible processes, understand their characteristics, and analyze their implications in various thermodynamic systems. 3. Familiarity with Carnot Cycle and Thermal Efficiency: Students should gain an understanding of the Carnot cycle, a theoretical reversible heat engine, and be able to calculate its thermal efficiency. They should also be able to compare the Carnot cycle with real-world thermodynamic systems. 4. Competence in Entropy Calculation: Students should be able to calculate entropy changes for different states of matter, including solid, liquid, and ideal gases. They should also understand how entropy is related to temperature, heat transfer, and phase changes. 5. Understanding Isentropic Processes and Entropy Balance: Students should be able to analyze and calculate entropy changes in isentropic processes and understand the concept of entropy balance in various thermodynamic systems. 6. Proficiency in Exergy Analysis: Students should be able to apply exergy analysis to closed systems and control volumes, understanding the concept of exergy and its significance in assessing the usefulness of energy. 7. Knowledge of Power Cycles: Students should gain knowledge of different power cycles, such as the Otto cycle, Diesel cycle, and Brayton cycle. They should understand their thermodynamic processes, efficiency, and the factors influencing their performance. 8. Understanding Vapor Power Cycles: Students should comprehend the principles of vapor power cycles, such as the Rankine cycle, and its variations with superheat and reheat. They should be able to analyze the efficiency and performance of these cycles.

	9. Introduction to Refrigeration Cycle: Students should gain an understanding of the basic principles of refrigeration cycles, including the concepts of heat transfer, compression, expansion, and the analysis of coefficient of performance (COP).
Indicative Contents المحتويات الإرشادية	Module Contents: **1. Introduction to the Second Law of Thermodynamic [8 hr]** - thermal energy - Kelvin–Planck statements - Clausius statement - Concepts of perpetual-motion machines **2. Reversible and Irreversible Process [8 hr]** - irreversible processes, - heat engines, - heat pumps and refrigerators - Temperature scale **3. Carnot Cycle and Thermal Efficiency [8 hr]** - Describe the Carnot cycle - Idealized Carnot heat engines, - Idealized Carnot Refrigerators, and heat pumps. **4. Introduction to Entropy [8 hr]** - Apply the second law of thermodynamics to processes - Principle of entropy increase - Entropy changes for pure substances, - Entropy changes for incompressible substances and solid - Entropy changes for and ideal gases - Entropy change for ideal gas with variable specific heat **5. Entropy balance [8 hr]** - Isentropic processes - Entropy balance and entropy change of systems - Mechanism of entropy transfer - Entropy generation - Entropy balance of closed system - Entropy balance of control volume **6. Isentropic Processes and Entropy balance [8 hr]** - Reversible steady flow work - Minimizing the compressible work - Isentropic efficiency of the steady flow device **7. Exergy and exergy balance of closed system [8 hr]** - Work potential of energy - Exergy change of a system - Mechanism of exergy transfer - Exergy decrease and destruction - Exergy balance of closed system **8. Exergy balance of control volume [8 hr]** - Exergy balance for steady flow system - Second law efficiency of steady flow device **9. Gas power cycles [8 hr]** - Ideal power cycle and Carnot power cycle - Air-standard cycle - Otto cycle **10. Gas power cycles [8 hr]** - Diesel cycle - Dual cycle - Brayton cycle **11. Development of Brayton cycle [8 hr]**

	- Brayton cycle from idealized one - Brayton cycle with Intercooling - Brayton cycle with Reheating - Brayton cycle with Regeneration **12. Vapor power cycles [8 hr]** - Carnot vapor cycle - Ideal Rankine cycle - Deviation of actual from idealized Rankine cycle **13. Rankine with superheat and reheat [8 hr]** - Actual steam power cycle - Improvement of Rankine cycle - Rankine cycle with superheat and reheat - Regenerative Rankine cycle **14. Vapor and Combined Power Cycles [8 hr]** - Energy analysis of simple combined power cycle **15. Introduction to Refrigeration cycle [8 hr]** - Reversed Carnot cycle - Ideal vapor compression cycle - Actual vapor compression cycle

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)
الحمل الدراسي للطالب

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1-9
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 0
	Midterm Exam	1hr	15% (15)	8	LO # 1-4

Summative assessment	**Final Exam**	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the Second Law of Thermodynamic
Week 2	Reversible and Irreversible Process
Week 3	Carnot Cycle and Thermal Efficiency
Week 4	Introduction to Entropy.
Week 5	Entropy calculation for solid, liquid and Ideal gases
Week 6	Isentropic Processes and Entropy balance
Week 7	Exergy and exergy balance of closed system
Week 8	Exergy balance of control volume
Week 9	Power cycles, Otto cycle,
Week 10	Diesel and Dual Cycle
Week 11	Brayton cycles. Brayton cycle with intercooling, reheating, and regeneration.
Week 12	Vapor power cycles
Week 13	Rankine with superheat and reheat
Week 14	Vapor and Combined Power Cycles
Week 15	Introduction to Refrigeration cycle
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	2. Yunus A. Cengel and Michael A. Boles. Thermodynamics: An Engineering Approach, 7th Ed. McGraw Hill, 2011.	Yes
Recommended Texts	3. Borgnakke, C. and Sonntag, R. E., Fundamentals of Thermodynamics, 7th Ed., John Wiley & Sons, 2009. 4. Moran, M.J., and Shapiro, H.N., Fundamental of Engineering Thermodynamics, 5th Ed., John Wiley &	PDF
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A –**Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C –Good	جيد	70 - 79	Sound work with notable errors.
	D –Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E –Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PRE223**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level			**Semester of Delivery**	4	
Administering Department	**Dept. of Petroleum & Refining Eng.**		**College**	**College of Petroleum and Mining Eng.**	
Module Leader	**Asst. Prof. Raqeeb H. Rajab**		**e-mail**	raqeeb.hummadi@uomosul.edu.iq	
Module Leader's Acad. Title	**Asst. Prof.**		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/1/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 27. Introduce Petroleum & Refining Engineeringstudents to the second law of thermodynamics and provide them examples from real engineering applications. Identify valid processes as those that satisfy both the first and second laws of thermodynamics. Reversible and irreversible process. 28. Apply the second law of thermodynamics to cycles and cyclic devices starting from idealized Carnot cycle including Carnot heat engines, refrigerators, and heat pumps.

	29. Determine the expressions for the thermal efficiencies and coefficients of performance for reversible heat engines, heat pumps, and refrigerators. 30. Define entropy to quantify the second-law effects. Establish the increase of entropy principle and how to calculate the entropy changes that take place during processes for pure substances, incompressible substances, and ideal gases. 31. Derive the reversible steady-flow work relations. Develop the isentropic efficiencies for various steady-flow devices. Introduce and apply the entropy balance to various systems. 32. Introduce gas power cycles for which the working fluid remains a gas throughout the entire cycle. Analyze both closed and open gas power cycles. Solve problems based on the Otto, 33. Diesel, Brayton cycle. Brayton cycle with regeneration; and the Brayton cycle with intercooling, reheating, and regeneration. 34. Analyze vapor power cycles in which the working fluid is alternately vaporized and condensed.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course students would be able to: 10. Understanding the Second Law of Thermodynamics: Students should be able to comprehend and explain the fundamental principles and concepts associated with the Second Law of Thermodynamics, such as entropy, irreversibility, and the direction of natural processes. 11. Knowledge of Reversible and Irreversible Processes: Students should be able to differentiate between reversible and irreversible processes, understand their characteristics, and analyze their implications in various thermodynamic systems. 12. Familiarity with Carnot Cycle and Thermal Efficiency: Students should gain an understanding of the Carnot cycle, a theoretical reversible heat engine, and be able to calculate its thermal efficiency. They should also be able to compare the Carnot cycle with real-world thermodynamic systems. 13. Competence in Entropy Calculation: Students should be able to calculate entropy changes for different states of matter, including solid, liquid, and ideal gases. They should also understand how entropy is related to temperature, heat transfer, and phase changes. 14. Understanding Isentropic Processes and Entropy Balance: Students should be able to analyze and calculate entropy changes in isentropic processes and understand the concept of entropy balance in various thermodynamic systems. 15. Proficiency in Exergy Analysis: Students should be able to apply exergy analysis to closed systems and control volumes, understanding the concept of exergy and its significance in assessing the usefulness of energy. 16. Knowledge of Power Cycles: Students should gain knowledge of different power cycles, such as the Otto cycle, Diesel cycle, and Brayton cycle. They should understand their thermodynamic processes, efficiency, and the factors influencing their performance. 17. Understanding Vapor Power Cycles: Students should comprehend the principles of vapor power cycles, such as the Rankine cycle, and its variations with superheat and reheat. They should be able to analyze the efficiency and performance of these cycles. 18. Introduction to Refrigeration Cycle: Students should gain an understanding of the basic principles of refrigeration cycles, including the concepts of heat transfer, compression, expansion, and the analysis of coefficient of performance (COP).
Indicative Contents المحتويات الإرشادية	Module Contents: **16. Introduction to the Second Law of Thermodynamic [8 hr]** - thermal energy - Kelvin–Planck statements - Clausius statement - Concepts of perpetual-motion machines **17. Reversible and Irreversible Process [8 hr]**

- irreversible processes,
- heat engines,
- heat pumps and refrigerators
- Temperature scale

18. Carnot Cycle and Thermal Efficiency [8 hr]

- Describe the Carnot cycle
- Idealized Carnot heat engines,
- Idealized Carnot Refrigerators, and heat pumps.

19. Introduction to Entropy [8 hr]

- Apply the second law of thermodynamics to processes
- Principle of entropy increase
- Entropy changes for pure substances,
- Entropy changes for incompressible substances and solid
- Entropy changes for and ideal gases
- Entropy change for ideal gas with variable specific heat

20. Entropy balance [8 hr]

- Isentropic processes
- Entropy balance and entropy change of systems
- Mechanism of entropy transfer
- Entropy generation
- Entropy balance of closed system
- Entropy balance of control volume

21. Isentropic Processes and Entropy balance [8 hr]

- Reversible steady flow work
- Minimizing the compressible work
- Isentropic efficiency of the steady flow device

22. Exergy and exergy balance of closed system [8 hr]

- Work potential of energy
- Exergy change of a system
- Mechanism of exergy transfer
- Exergy decrease and destruction
- Exergy balance of closed system

23. Exergy balance of control volume [8 hr]

- Exergy balance for steady flow system
- Second law efficiency of steady flow device

24. Gas power cycles [8 hr]

- Ideal power cycle and Carnot power cycle
- Air-standard cycle
- Otto cycle

25. Gas power cycles [8 hr]

- Diesel cycle
- Dual cycle
- Brayton cycle

26. Development of Brayton cycle [8 hr]

- Brayton cycle from idealized one
- Brayton cycle with Intercooling
- Brayton cycle with Reheating
- Brayton cycle with Regeneration

27. Vapor power cycles [8 hr]

- Carnot vapor cycle
- Ideal Rankine cycle
- Deviation of actual from idealized Rankine cycle

28. Rankine with superheat and reheat [8 hr]

- Actual steam power cycle
- Improvement of Rankine cycle

	- Rankine cycle with superheat and reheat - Regenerative Rankine cycle **29. Vapor and Combined Power Cycles [8 hr]** - Energy analysis of simple combined power cycle **30. Introduction to Refrigeration cycle [8 hr]** - Reversed Carnot cycle - Ideal vapor compression cycle - Actual vapor compression cycle

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	4, 9, 12	LO #1-9
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 0
Summative assessment	Midterm Exam	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the Second Law of Thermodynamic

Week 2	Reversible and Irreversible Process
Week 3	Carnot Cycle and Thermal Efficiency
Week 4	Introduction to Entropy.
Week 5	Entropy calculation for solid, liquid and Ideal gases
Week 6	Isentropic Processes and Entropy balance
Week 7	Exergy and exergy balance of closed system
Week 8	Exergy balance of control volume
Week 9	Power cycles, Otto cycle,
Week 10	Diesel and Dual Cycle
Week 11	Brayton cycles. Brayton cycle with intercooling, reheating, and regeneration.
Week 12	Vapor power cycles
Week 13	Rankine with superheat and reheat
Week 14	Vapor and Combined Power Cycles
Week 15	Introduction to Refrigeration cycle
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	3. Yunus A. Cengel and Michael A. Boles. Thermodynamics: An Engineering Approach, 7th Ed. McGraw Hill, 2011.	Yes
Recommended Texts	5. Borgnakke, C. and Sonntag, R. E., Fundamentals of Thermodynamics, 7th Ed., John Wiley & Sons, 2009. 6. Moran, M.J., and Shapiro, H.N., Fundamental of Engineering Thermodynamics, 5th Ed., John Wiley &	PDF
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A –**Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C –Good	جيد	70 - 79	Sound work with notable errors.
	D –Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E –Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**The crimes of the Baath regime in Iraq**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**UOM2050**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	2		**Semester of Delivery**	2	
Administering Department	Petroleum Engineering		**College**	Engineering college	
Module Leader	Basma Mohamed Natheer Ahmed		**e-mail**	Bsmam2022@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/09/2024		**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 Objectives أهداف المادة الدراسية	• **توعية. .الطلاب بالجرائم التي ارتكبها البعث في العراق..** • **توجيه الطلاب للإلمام والمعرفة بالجرائم.....** **توعية الطلاب بخطورة الجرائم.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. **فهم تاريخي ومعرفي**: أن يكون لدى الطلاب فهم عميق للجرائم التي ارتكبها البعث في العراق، بما في ذلك السياق التاريخي والأسباب والنتائج. 2. **تطوير الوعي النقدي**: أن يتمكن الطلاب من تحليل وتقييم الأحداث التاريخية بشكل نقدي، وفهم تأثيرها على المجتمع العراقي. 3. **تعزيز القيم الإنسانية**: أن يتعلم الطلاب أهمية حقوق الإنسان والعدالة، وأن يكونوا قادرين على التعرف على انتهاكات حقوق الإنسان والتصدي لها.
Indicative Contents المحتويات الإرشادية	• **مفهوم الجرائم وأقسامها**: ○ تعريف الجريمة. ○ أنواع الجرائم (جنائية، سياسية، اجتماعية، إلخ). ○ أمثلة على كل نوع. • **أنواع الجرائم الدولية**: ○ تعريف الجرائم الدولية. ○ أمثلة على الجرائم الدولية (جرائم الحرب، الجرائم ضد الإنسانية، الإبادة الجماعية). ○ القوانين والمعاهدات الدولية المتعلقة بالجرائم الدولية.: • **الجريمة السياسية**: ○ تعريف الجريمة السياسية. ○ أمثلة على الجرائم السياسية. ○ تأثير الجرائم السياسية على المجتمع والدولة. ○ مراجعة شاملة للمواضيع التي تم تغطيتها في الأسابيع الثلاثة الأولى. ○ امتحان قصير لتقييم فهم الطلاب. • **الجريمة الاجتماعية**: ○ تعريف الجريمة الاجتماعية. ○ أمثلة على الجرائم الاجتماعية. • **جريمة قمع الانتفاضة الشعبانية**: ○ خلفية تاريخية عن الانتفاضة الشعبانية. ○ تفاصيل الجرائم المرتكبة خلال قمع الانتفاضة. • **الجرائم النفسية وآثارها**: ○ تعريف الجرائم النفسية. ○ أمثلة على الجرائم النفسية. ○ الآثار النفسية والاجتماعية لهذه الجرائم.

	• **جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا 2005:** ○ نظرة عامة على قانون المحكمة الجنائية العراقية العليا. ○ أمثلة على الجرائم التي ارتكبها نظام البعث والتي تم محاكمتها بموجب هذا القانون. • **جرائم أحداث صلاة الجمعة:** ○ خلفية عن أحداث صلاة الجمعة. ○ تفاصيل الجرائم المرتكبة خلال هذه الأحداث. • **جرائم المقابر الجماعية:** ○ تعريف المقابر الجماعية. ○ أمثلة على المقابر الجماعية في العراق. • **قصف العتبات المقدسة:** ○ خلفية عن قصف العتبات المقدسة. ○ تفاصيل الجرائم المرتكبة خلال هذه الأحداث. • **الهجوم الكيميائي على حلبجة:** ○ خلفية عن الهجوم الكيميائي على حلبجة. ○ تفاصيل الجرائم المرتكبة خلال هذا الهجوم. • **استعمال الأسلحة المحرمة دولياً:** ○ تعريف الأسلحة المحرمة دولياً. ○ أمثلة على استخدام هذه الأسلحة في العراق. ○ تأثير هذه الجرائم على المجتمع. ○ مراجعة شاملة للمواضيع التي تم تغطيتها في الأسابيع السابقة. ○ امتحان لتقييم فهم الطلاب. • **الجرائم البيئية لنظام البعث في العراق:** ○ تعريف الجرائم البيئية. ○ أمثلة على الجرائم البيئية التي ارتكبها نظام البعث. • **أحداث المقابر والإبادة الجماعية المرتكبة من النظام البعثي في العراق:** ○ خلفية عن أحداث المقابر والإبادة الجماعية. ○ تفاصيل الجرائم المرتكبة خلال هذه الأحداث.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**المحاضرات التفاعلية** • **وصف الاستراتيجية:** تقديم محاضرات تتضمن تفاعلًا مباشرًا مع الطلاب من خلال طرح أسئلة، وإجراء مناقشات، واستخدام وسائل تعليمية متعددة مثل الفيديوهات والصور. • **الفوائد:** يحافظ على انتباه الطلاب ويشجع على المشاركة الفعالة. **التعلم القائم على القيم** • **وصف الاستراتيجية: التركيز على القيم الإنسانية والأخلاقية من خلال مناقشة تأثير الجرائم على حقوق الإنسان والعدالة.** • **الفوائد: يعزز الوعي بالقيم الإنسانية ويشجع على التفكير النقدي حول القضايا الأخلاقية.**

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation

تقييم المادة الدراسية

As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	None	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	**Material Covered**
Week 1	مفهوم الجرائم واقسامها
Week 2	انواع الجرائم الدولية
Week ٣	الجريمة السياسية
Week ٤	امتحان
Week ٥	الجريمة الاجتماعية
Week ٦	جريمة قمع الانتفاضة الشعبانية
Week ٧	الجرائم النفسية واثارها
Week ٨	جرائم نظام البعث وفق قانون المجكمة الجنائية العراقية العليا ٢٠٠٥
Week ٩	جرائم احاث صلاة الجمعة
Week ١٠	جرائم المقابر الجماعية
Week ١١	قصف العتبات المقدسة
Week ١٢	الهجوم الكيميائي على حلبجة
Week ١٣	استعمال الاسلحة المحرمة دوليا

Week ١٤	الجرائم البيئية لنظام البعث في العراق
Week ١٥	احداث المقابر والابادة الجماعية المرتكبة من النظام البعثي في العراق

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	كتاب المقرر جرائم نظام البعث في العراق من قبل وزارة التعليم العالي والبحث العلمي	NO
Recommended Texts		
Websites		

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

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

MODULE DESCRIPTOR FORM

الدراسية المادة وصف نموذج

Module Information **معلومات المادة الدراسية**					
Module Title	Engineering Analysis I			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	**PRe311**			☒ **Lecture**	
ECTS Credits	4			☐**Lab**	
SWL (hr/sem)	100			☐ **Tutorial** ☐**Practical** • ☐ **Seminar**	
Module Level	3		**Semester of Delivery**	5	
Administering Department	PGR		**College**	PM	
Module Leader	Zahraa Ghanim Youins Al-alaf		**e-mail**	zahraaalmajidi@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval	1/6/2026		**Version Number**	١	

Relation With Other Modules **الأخرى الدراسية المواد مع العلاقة**			
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 **الدراسية المادة أهداف**	• Providing students with the foundations of scientific knowledge in the field of engineering and improving professional capabilities in the direction of analytical thinking. The use of modern technologies in the		

	use of information technologies and modern experimental methods in formulating and solving problems • Providing well-qualified engineers to improve the activities of chemical engineering and the ability to manage dealing with it in all facilities life. • Procedure of scientific research of an academic nature to keep pace with the global scientific process and research of an applied nature to translate, Engineering knowledge and its theories into a work reality by addressing the problems that the country suffers from in all fields. • Discuss and understand first-order and second-order differential equations • Understanding higher order differential equations • Understanding Second Order Differential equations (Non linear, Linear) equations • Understanding Second Order Differential consider complex equation can solve by sepecial cases such as (Frobenius andBessel function)
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	• Education is a broad to understand the impact of engineering solutions globally and economically. • Ability to work in multi groups in engineering majors • The ability to use the techniques, skills and tools of contemporary engineering in the engineering field • The possibility of applying cognitive sciences such as mathematics, pure sciences and engineering. • The possibility of designing and implementing experiments, analyzing of the results and applications. • The ability to solve differential equations for any degree. • The ability to solve the second differential equation (Non linear, Linear by D-operator). • The ability to solve the complex equation by Frobenius method and Bessel equations
Indicative Contents **المحتويات الإرشادية**	• First Order Differential equations (Separable, Homogenous, Exact, Linear, Bernoulli). 12 hrs • Second Order Differential equations (Non linear, Linear, solve by D operator). 16 hrs • Modified equations, Higher order equations, Euler's equation, Simultaneous equations. 12 hrs • Solve differential equations by series method (Frobenius). 8 hrs • Solve differential equations by series method (Bessel function). 8 hrs

Learning and Teaching Strategies والتعليم التعلم استراتيجيات	
Strategies	We worked in to divide the students into groups to encourage student's participation in the exercises and discussion during solving the problems. Make a homework concerning the subject of the lectures, and do seminars to present the work.

Student Workload (SWL) للطالب الدراسي الحمل			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	59	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	4
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	41	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	2.92
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	100		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20	6, 14	Q1 for1-5, Q2 for 10-14
	Assignments	2	10	7, 9	Hw.1: 6-7and Hw.2: 8-9
	Projects / Lab.			continues	
	Report	1	10		
Summative assessment	**Midterm Exam**	1	10	9	M. E 1-10
	Final Exam	1	50	16	All

Total assessment			

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
Week	**Material Covered**
Week 1	First Order Differential equations (Separable, Homogenous, Exact, Linear, Bernoulli)
Week 2	First Order Differential equations (Separable, Homogenous, Exact, Linear, Bernoulli)
Week 3	First Order Differential equations (Separable, Homogenous, Exact, Linear, Bernoulli)
Week 4	Second Order Differential equations (Non linear, Linear, solve by D operator).
Week 5	Second Order Differential equations (Non linear, Linear, solve by D operator).
Week 6	Second Order Differential equations (Non linear, Linear, solve by D operator).
Week 7	Second Order Differential equations (Non linear, Linear, solve by D operator).
Week 8	Modified equations, Higher order equations, Euler's equation, Simultaneous equations
Week 9	Modified equations, Higher order equations, Euler's equation, Simultaneous equations
Week 10	Modified equations, Higher order equations, Euler's equation, Simultaneous equations
Week 11	Solve differential equations by series method (Frobenius).
Week 12	Solve differential equations by series method (Frobenius).
Week 13	Solve differential equations by series method (Bessel function).
Week 14	Solve differential equations by series method (Bessel function).
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**

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

Learning and Teaching Resources **والتدريس التعلم مصادر**		
	Text	**Available in the Library?**
Required Texts	Advanced engineering mathematics, Erwin kreyszig	
Recommended Texts	Chemical Engineering mathematics by Jeffrey	
Websites		

APPENDIX:

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Petroleum refining process I			**Module Delivery**	
Module Type	Core			☒ **Theory**	
Module Code	PRe313			☐ **Lecture**	
ECTS Credits	8			☒ **Lab**	
SWL (hr/sem)	150			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 3		**Semester of Delivery**	5	
Administering Department	PRE		**College**	PM	
Module Leader	Dr. Maher. O. Ahmed		**e-mail**		
Module Leader's Acad. Title	Proffesor		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval	1-6-2026		**Version Number**	1	

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. Ability to dehydrate and desalting crude oils.** **2. Ability to heat and distillate crude oils to its products at atmospheric and vacuum pressures.** **3. Ability to produce high octane number gasoline by different processes.** **4. Ability to produce lubricating oils by many processes.**		

	5. Ability to decrease sulfur content by hydrogenation processes **6. Ability to find the best processes and operating conditions to produce petroleum products.** 7.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Recognize how Petroleum Refinery works .** **2. List the various terms associated with Refinery Equipments.** **3. Summarize what is meant by a basic Refinery Units** **4. Discuss the reaction and involvement of atoms in Petroleum Industry** **5. Describe Petroleum Fields Processes** **6. Define Processes in Petroleum Industry** **7. Identify the basic elements and their applications.** **8. Discuss the operations of Atmospheric Distillation process.** **9. Discuss the Vacuum Distillation Process** **10. Explain the two main Towers in Petroleum Industry**
Indicative Contents المحتويات الإرشادية	1. Fields Petroleum & Gas Processes 2. Atmospheric & Vacuum Distillation 3. Utilities Processes
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	150	**Structured SWL (h/w)**	7

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**		**10**		
	Assignments		**5**		
	Projects / Lab.		**10**		
	Report		**5**		
Summative assessment	**Midterm Exam**		**20**		
	Final Exam		**50**		
Total assessment			**100**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Petroleum Well processes**
Week 2	**Petroleum Well processes**
Week 3	**Desalting of crude oil**
Week 4	**Refinery Categories**
Week 5	**Principles of Refining Process**
Week 6	**General Flow Diagram of Refinery**

Week 7	**Types of Distillation**
Week 8	**Atmospheric distillation**
Week 9	**Vacuum distillation**
Week 10	**Steam Stripping**
Week 11	***Extractive Distillation**
Week 12	**Sweetening process**
Week 13	***Lubricating oils products**
Week 14	**Greases**
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	**Emulsification**
Week 2	**Emulsification**
Week 3	**Desalting**
Week 4	**Batch Distillation**
Week 5	**Multicomponent Distillation**
Week 6	**Extractive Distillation**
Week 7	**Sweetening process**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Fundamentals of petroleum refining by Fahim.**	**yes**
Recommended Texts	**1- Petroleum refining engineering by Nelson.** **2-Petroleum refining by Parakash**	yes
Websites	**School of mine in Colorado Website**	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

Note:

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

Module Description Form

Module Information					
Module Title	**Petrochemical Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**PRE316**			☐**Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level		**UGx11 3**	**Semester of Delivery**		**5**
Administering Department		**PRE**	**College**	**PM**	
Module Leader	**Dr. Liqaa. I Saeed**		**e-mail**	**omaroilgas@tu.edu.iq**	
Module Leader's Acad. Title		**Assistant professor**	**Module Leader's Qualification**		**PhD**
Module Tutor	**N/A**		**e-mail**	**N/A**	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		**1/6/2026**	**Version Number**		**1.0**

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Objectives	**1. Introduction to petrochemical engineering.** **2. Chemicals from direct conversion of methane.** **3. Production of methanol & methanol to olefins MTO process.** **4. Methanol to Gasoline MTG process.** **5. Mobil olefin to gasoline & distillate (MOGD) process.** **6. Production of iso-octane** **7. GTL process.** **8. Production of urea** **9. Production of benzene and xylene** **10. Production of linear alkyl-benzene** **11. Production of linear alkyl-benzene sulphonic acid** **12. Production of HDPE and LDPE** **13. Production of PVC** **14. Production of polystyrene and DVPS**
Module Learning Outcomes	**1. Knowing the fundamentals of petrochemical industry and petrochemical feedstock.** **2. Knowing the fundamentals syngas process and chemicals from syngas.** **3. Knowing the fundamentals of syngas to methanol process and production of olefins.** **4. Knowing the fundamentals of methanol to gasoline process** **5. Knowing the fundamentals of olefins oligomerization process to gasoline and distillates.** **6. Knowing the fundamentals of HF alkylation process of C4= and iC4 to produce iC8** **7. Knowing the fundamentals of Fischer Tropsch technology.** **8. Knowing the fundamentals of ammonia and nitrogenic fertilizers process .** **9. Knowing the fundamentals of thermal hydrodealkylation process THDA.** **10. Knowing the fundamentals of PACOL & HF detergent Processes.** **11. Knowing the fundamentals of sulphonation process.**

	12. Knowing the fundamentals of HDPL & LDPE manufacturing. **13. Knowing the fundamentals of PVC manufacturing.** **14. Knowing the fundamentals of ion-exchangers manufacturing.**
Indicative Contents	**Part A: Introduction to petrochemical engineering and petrochemical feedstock [4 hr.], Part B: The fundamentals of Syngas technology [20 hr.], Part C: GTL processes [8 hr.], Part D: Chemicals based on benzene [12 hr.], Part E: Polymer engineering and manufacturing of HDPE, LDPE, PS, and DVPS [12 hr.]**

Learning and Teaching Strategies	
Strategies	**The main strategy that will be adopted in delivering this module is to motivate students' participation in the class by raising questions and inquiries while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, symposiums that are interesting to the students, and self-assessment tests.**

Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**56**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**91**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**6.5**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

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

Delivery Plan (Weekly Syllabus)	
Week	**Material Covered**
Week 1	**Introduction to petrochemical engineering.**
Week 2	**Chemicals from direct conversion of methane.**
Week 3	**Production of methanol & methanol to olefins MTO process.**
Week 4	**Methanol to Gasoline MTG process.**
Week 5	**Mobil olefin to gasoline & distillate (MOGD) process.**
Week 6	**Production of iso-octane**
Week 7	**GTL process.**
Week 8	**Production of urea**
Week 9	**Production of benzene and xylene**
Week 10	**Production of linear alkyl-benzene**
Week 11	**Production of linear alkyl-benzene sulphonic acid**
Week 12	**Production of HDPE and LDPE**
Week 13	**Production of PVC**
Week 14	**Production of polystyrene and DVPS**
Week 15	**Preparatory week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
Week	**None**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**Fundamentals of petroleum and petrochemical engineering by Ray**	**Yes**
Recommended	**Chemistry of petrochemical processes by Sami Matar**	**No**
Websites	https://www.google.iq/books/edition/_/k0RhuQEACAAJ?hl=en&sa=X&ved=2ahUKEwj6_tbDpL3_AhWhgP0HHWnSCiwQre8FegQIGxAG	

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	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**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**PRE314**			☒ **Lecture**	
ECTS Credits	**5**			☐ **Lab**	
SWL (hr/sem)	**125**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 3		**Semester of Delivery**	5	
Administering Department	PRE		**College**	PM	
Module Leader	Dr. Ahmad A. Aabid		**e-mail**	ahmadchemical1991@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ahmad A. Aabid		**e-mail**	ahmadchemical1991@uomosul.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The major aim of this course is to give the student the required knowledge for design and operation of chemical reactors including single and multiple-reactors system. it will cover concepts ranging from basics such as the kinetics of homogeneous reactions, rate equation, searching for a mechanism, to the reactor design including batch reactor, mixed flow reactors, plug flow reactors, and other design parameters like size comparison of single reactors, pressure drop in packed bed reactor.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the principles of chemical engineering, including material balance with chemical reaction and chemical reaction equilibrium. 2. Able to design a chemical reactor that need it in petroleum refinery . 3. Ability to deal with rate equation. 4. Ability to deal with all reactor types and their design for single or multiple. 5.Ability to deal with reactions (reversible, irreversible, series, parallel, etc.). • The skills goals special to the course. This course will provide students with sufficient understanding to convert the information obtained by laboratory into information useful in designing chemical reactors, which will make the most of them in the next phase of designing the reactors for the engineering project and thus provide a graduate who is able to design reactors. • C. Affective and value goals At the end of the course presented, the student will possess all the necessary skills to deal with problems in designing or operating reactors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Kinetics of Homogeneous Reactions: Concentration dependent term of a rate equation in single and multiple reactions, elementary and nonelementary reactions , molecularity and order of reaction, rate constant k , testing kinetic models, temperature dependency from Arrhenius' Law, Activation energy and temperature dependency.[8 hrs] Predictability of reaction rate from theory. Concentration-Dependent Term , Temperature-Dependent Term , Use of Predicted Values in Design .[2 hrs] 2. Interpretation of batch reactor data: Constant-volume batch reactor, analysis of total pressure data obtained in a constant-volume system, the conversion, integral method of analysis of data, irreversible unimolecular-type first-order reactions, irreversible bimolecular-type second-order reactions, empirical rate equations of nth order, zero-order reactions, overall order of irreversible reactions from the half-life $t_{1/2}$, Irreversible reactions in parallel, Varying- volume batch reactor, **nth-**order and other reactions. for all rate forms other than zero-, first-, and second-order the integral method of analysis. [12hrs]

	3. Temperature and reaction rate, the search for a rate equation, Calculation of k from Individual data points, calculation of k from pairs of data points, graphical method of fitting data.[4 hrs] 4. Introduction to reactor design , general discussion, symbols and relationship between CA and XA , constant density batch and flow systems, batch and flow systems of gases of changing density but with T and π constant, batch and flow systems for gases in general (varying p, T,π). [4 hrs] 5. Ideal reactors for a single reaction: Ideal batch reactor, space-time and space-velocity, steady-state mixed flow, steady-state plug flow reactor, holding time and space time for flow reactors.[8 hrs] 6. Design for single reactions: Size comparison of single reactors (batch reactor , mixed versus plug flow reactors, first- and second-order reactions, variation of reactant ratio for second-order reactions, general graphical comparison [2 hrs]. 7. Multiple-reactor systems: Plug flow reactors in series and/or in parallel, equal-size mixed flow reactors in series, mixed flow reactors of different sizes in series, finding the conversion in a given system, determining the best system for a given conversion, reactors of different types in series, recycle reactor, autocatalytic reactions, plug flow versus mixed flow reactor, no recycle, optimum recycle operations, reactor combinations, [12 hrs]. 8. Design for parallel reactions: Introduction to multiple reactions, the selectivity, the side entry reactor [2 hrs]. 9. Potpourri of multiple reactions: irreversible first-order reactions in series, first-order followed by zero-order reaction, zero-order followed by first-order reaction , successive irreversible reactions of different orders , reversible reactions, irreversible series-parallel reactions, two- step irreversible series-parallel reactions, the Denbigh reactions and their special cases.[4 hrs] 10. Temperature and pressure effects: Single reactions, heats of reaction from thermodynamics, exothermic reactions in mixed flow reactors-a special problem, adiabatic plug flow reactor performance . 11. Pressure drop in packed bed reactor, pseudo - order reactions [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This document provides the academic description of the reactor design course, which includes introducing the skills of the third stage students in the department of petroleum refinery engineering to understand what chemical reactions are from an engineering point of view. This course will provide students with sufficient

	understanding to convert the information obtained by laboratory into information useful in designing chemical reactors, which will make the most of them in the next phase of designing the reactors for the engineering project and thus provide a graduate who is able to design reactors.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	**Material Covered**
Week 1	Kinetics of Homogeneous Reactions: Concentration-Dependent Term of a Rate Equation
Week 2	Temperature-Dependent Term of a Rate Equation
Week 3	Searching for a Mechanism
Week 4	Predictability of Reaction Rate from Theory
Week 5	Interpretation of Batch Reactor Data: Constant-volume Batch Reactor

Week 6	Ideal Batch Reactors
Week 7	Mid-term Exam + Temperature and Reaction Rate
Week 8	Size Comparison of Single Reactors
Week 9	Multiple-Reactor Systems
Week 10	Design for Parallel Reactions
Week 11	Irreversible First-Order Reactions in Series
Week 12	Pressure Drop in Packed Bed Reactor
Week 13	Pseudo - Order Reactions
Week 14	Reversible Reactions
Week 15	Irreversible Series-Parallel Reactions
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Chemical reactors design by Fogler	Yes
Recommended Texts	Chemical Reaction Engineering Third Edition Octave Levenspiel	Yes
Websites	https://sites.tufts.edu/andrewrosen/files/2013/09/reactor_design_guide1.pdf	

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 DESCRIPTOR

وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Heat Transfer I			**Module Delivery**	
Module Type	CORE			☒ **Theory**	
Module Code	**PRE** 315			☐ **Lecture**	
ECTS Credits	4			☐ **Lab**	
SWL (hr/sem)	١٥٠			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 UGIII		**Semester of Delivery**	5	
Administering Department	**PRE**		**College**	**PM**	
Module Leader	**Asst. Prof. Raqeeb H. Rajab**		**e-mail**	raqeeb.hummadi@uomosul.edu.iq	
Module Leader's Acad. Title	-		**Module Leader's Qualification**	-	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	-		**e-mail**	-	
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics I and II, Thermodynamic I	**Semester**	1 and 2
Co-requisites module	-	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	This course provides a comprehensive introduction to heat transfer fundamentals and the module objectives for heat transfer including: 1.Introduce the student Basic Concepts of the fundamental principles and laws of the main scientific principle in the field of conduction heat transfer, physical mechanism		

	and to explore the implications of these principles for system behavior including, including use graphs and diagrams to convey results. 2. Introduce the student of the Basic Concepts convection heat transfer
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Understand a thermal system, develop the schematic diagram for the system, and apply energy balance and heat transfer models to develop governing equations. 2. Set up and solve for heat transfer rates as a function of geometry and materials in 1-D conduction using various tools: i.Material properties ii. Fourier's Law iii. Circuit Analogy 3. Estimate heat transfer from Extended Surfaces, Radial Geometry, and involving Energy Generation. 4. Construct a transient heat transfer analysis, testing for the lumped capacitance approximation, semi-infinite, infinite solids and understanding the assumptions. 5. Understand the approach for setting up numerical analysis for 2-D conduction heat transfer. 6. The ability to calculation Overall Heat Transfer Coefficient 7. The ability to understand study the heat conduction through a large plane wall, cylinder and sphere as one-dimension steady state case and a multilayer plane walls, cylinders, and spheres medium under steady conditions and unsteady conditions. 8. Ability to calculating the heat transfer from finned surfaces. 9. Ability to calculating critical radius of insulation 10. The ability to understand to Basic Concepts convection heat transfer.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Basic modes of Heat Transfer [6 hrs] ● Conduction Heat Teanser ● Convection Heat Transfer 2. Multilayer plane Walls, cylinder and sphere [15 hrs] ● Multilayer plane Walls ● Heat conduction in cylinders and spheres ● Multilayer cylinder and sphere 3. Heat Conduction Equation [15 hrs] ● Heat Generation

	● One dimensional Heat Conduction Equation ● boundary condition 4. Heat Transfer from Finned Surfaces [20 hrs] ● Infinitely Long Fin ● The Fin is Finite Length and Loses Heat by convection from its end ● Fin efficiency ● Fin effectiveness 5. Steady –state conduction –multiple dimensions [15 hrs] ● Heat transfer in common configurations ● Two-dimensional steady heat conduction ● Boundary nodes 6. Transient Heat conduction [20 hrs] ● Lumped system analysis ● Criteria for lumped system analysis ● Transient heat conduction in large plane walls ● Transient heat conduction long cylinders and spheres with spatial effects ● Transient heat conduction in semi-infinite solids 7. fundamentals of convection [4 hrs]
Course Description	This is the first course in heat transfer, with an emphasis on understanding the fundamental physics underlying different heat transfer processes, making proper approximations for analytical heat transfer calculations and numerical methods for engineering heat transfer analysis. Topics include: introduction to three modes of heat transfer, thermal resistance network analysis, steady-state conduction, transient conduction, analytical methods for heat conduction.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching **strategy** is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	٤
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	١٥٠		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Heat transfer (Basic modes of Heat Transfer)
Week 2	Steady state one dimension conduction in plane wall without heat generation, Solved problems.
Week 3	Steady state one dimension conduction in cylinder and sphere without heat generation, , Solved problems.
Week 4	Steady state one dimension conduction in sphere without heat generation, , Solved problems.
Week 5	Steady state one dimension conduction in plane wall with heat generation, Solved problems.
Week 6	Steady state one dimension conduction in cylinder and sphere with heat generation, Solved problems.
Week 7	Steady –state conduction –multiple dimensions (Two-dimensional) , Solved problems.

Week 8	Midterm exam
Week 9	Extended surfaces (Fins), fin general conduction analysis, Solved problems.
Week 10	Fin efficiency and Fin effectiveness, Solved problems.
Week 11	Critical thickness of insulation, Solved problems.
Week 12	Lumped heat capacity system, Solved problems.
Week 13	Unsteady state conduction in convection boundary conditions, Solved problems.
Week 14	Transient heat flow in a semi-infinite solid, Solved problems.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Fundamentals of Heat and Mass Transfer -by Incropera. 2- Mass Transfer: Fundamentals & Applications by Yunus Cengel.	Yes
Recommended Texts	1.Heat transfer By : J.P. Holman	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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

MODULE DESCRIPTOR FORM

الدراسية المادة وصف نموذج

Module Information **معلومات المادة الدراسية**					
Module Title	Engineering Analysis II			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	PRE321			☒ **Lecture**	
ECTS Credits				☐**Lab**	
SWL (hr/sem)	100			☐ **Tutorial** ☐**Practical** • ☐ **Seminar**	
Module Level	3		**Semester of Delivery**	6	
Administering Department	PRE		**College**	PM	
Module Leader	Zahraa Ghanim Youins Al-alaf		**e-mail**	zahraaalmajidi@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. LECTUER		**Module Leader's Qualification**	MSc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval	١-٩-٢٠٢٥		**Version Number**	١	

Relation With Other Modules **الأخرى الدراسية المواد مع العلاقة**			
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 **الدراسية المادة أهداف**	• Providing students with the foundations of scientific knowledge in the field of engineering and improving professional capabilities in the direction of analytical thinking. The use of modern technologies in the		

	use of information technologies and modern experimental methods in formulating and solving problems • Providing well-qualified engineers to improve the activities of chemical engineering and the ability to manage dealing with it in all facilities life. • Procedure of scientific research of an academic nature to keep pace with the global scientific process and research of an applied nature to translate, Engineering knowledge and its theories into a work reality by addressing the problems that the country suffers from in all fields. • Discuss and understand the laplace transformation • The ability to find the partial differential equation • Understanding mathematical modeling
Module Learning Outcomes **للمادة التعلم مخرجات الدراسية**	• Education is a broad to understand the impact of engineering solutions globally and economically. • Ability to work in multi groups in engineering majors • The ability to use the techniques, skills and tools of contemporary engineering in the engineering field • The possibility of applying cognitive sciences such as mathematics, pure sciences and engineering. • The possibility of designing and implementing experiments, analyzing of the results and applications. • The ability to solve the partial differential equation (two dimension or three). • The ability to find final solution by Laplace transforms for any (differential equation or partial differential equation). • Discuss mathematical modeling and applications to chemical engineering equipments in the steady state and unsteady state
Indicative Contents **الإرشادية المحتويات**	• Laplace transformation. 16 hrs • Partial differential equations (Separation of variables, change of variables, Laplace transforms). 12 hrs • Formula of special function. 6 hrs • Mathematical Modeling (Applications to chemical engineering equipments in the steady state and unsteady state). 22 hrs
Learning and Teaching Strategies **والتعليم التعلم استراتيجيات**	
Strategies	We worked in to divide the students into groups to encourage student's participation in the exercises and discussion during solving

	the problems. Make a homwork concerning the subject of the lectures, and do seminars to present the work.

Student Workload (SWL) **للطالب الدراسي الحمل**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	59	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	4
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	41	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	2.92
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	100		

Module Evaluation **تقييم المادة الدراسية**					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20	6, 14	Q1 for1-5, Q2 for 10-14
	Assignments	2	10	7, 9	Hw.1: 6-7and Hw.2: 8-9
	Projects / Lab.			continues	
	Report	1	10		
Summative assessment	**Midterm Exam**	1	10	9	M. E 1-10
	Final Exam	1	50	16	All
Total assessment					

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Laplace transformation
Week 2	Laplace transformation
Week 3	Laplace transformation
Week 4	Laplace transformation
Week 5	Partial differential equations (Separation of variables, change of variables, Laplace transforms).
Week 6	Partial differential equations (Separation of variables, change of variables, Laplace transforms).
Week 7	Partial differential equations (Separation of variables, change of variables, Laplace transforms).
Week 8	Formula of special function
Week 9	Formula of special function / Mathematical Modeling (Applications to chemical engineering equipments in the steady state and unsteady state).
Week 10	Mathematical Modeling (Applications to chemical engineering equipments in the steady state and unsteady state).
Week 11	Mathematical Modeling (Applications to chemical engineering equipments in the steady state and unsteady state).
Week 12	Mathematical Modeling (Applications to chemical engineering equipments in the steady state and unsteady state).
Week 13	Mathematical Modeling (Applications to chemical engineering equipments in the steady state and unsteady state).
Week 14	Mathematical Modeling (Applications to chemical engineering equipments in the steady state and unsteady state).
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources **والتدريس التعلم مصادر**		
	Text	**Available in the Library?**
Required Texts	Advanced engineering mathematics, Erwin kreyszig	
Recommended Texts	Chemical Engineering mathematics by Jeffrey	
Websites		

APPENDIX:

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

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	mass transfer 2			**Module Delivery**	
Module Type	Core			☒ **Theory**	
Module Code		PRE322		☐ **Lecture**	
ECTS Credits	5			☐ **Lab**	
SWL (hr/sem)	125			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 3		**Semester of Delivery**	6	
Administering Department	PRE		**College**	PM	
Module Leader	Dr. Ahmed A. Aabid		**e-mail**	Ahmadchemical1991@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval	1/6/2026		**Version Number**	1	

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	8. A detailed study of the main chemical separation units. 9. Using the correct criteria to select the appropriate technology for chemical separation processes. 10. Studying the design calculations for the equilibrium stages of chemical separation processes (, , distillation, extraction, evaporation and humidification).		

	11. Familiarity with material transfer calculations. 12. Familiarity with the design calculations of extraction. 13. Diagnosis and analysis of various chemical separation processes in industrial facilities, especially oil ones.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Studying the processes of enthalpy- composition diagram (H_X diagram) and multi-compound distillation with the derivation of all the basic design equations. 2. Studying solvent extraction processes using an appropriate solvent and the conditions for using it with all design equations. 3. Studying the evaporation processes for the concentration of aqueous solutions and the derivation of the basic equations for the balance of matter and energy. 4. Studying air humidification and cooling towers and design calculations of cooling tower.
Indicative Contents المحتويات الإرشادية	Part A: Distillation. - Learn about enthalpy composition diagram. - Learn about multi-component distillation and the equations used in its calculations. (16 hr.) Part B: Extraction. - Learn about solvent extraction and equilibrium equations. - Recognize the number of stages of a complete immiscible solvent. - Recognize the partial separation using triangle curves and methods of their calculations. - Learn about solvent extraction devices and how they work. (20 hr.) Part C: Evaporation. - Identify the methods of evaporation and the differences between them and the equations used in their calculation. - Learn about counter-directional evaporation and the equations used in its calculations. - Learn about co-current directional evaporation and the equations used in its calculations. (12 hr.). Part D: Humidification. - Identify humidity and relative humidity in the case of constant temperature. - Understand the processes of hydration, phase balance, graphics and equations. – Equation and calculation of cooling tower design. (12 hr.).
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The students will be actively engaged in the tasks, which will help them develop and hone their critical thinking abilities. This will be accomplished. Via lectures, interactive tutorials, and assignments incorporating fascinating tasks. The

	course includes: 1- Numerous examples worked out in detail to illustrate the basic principles. 2- A consistent strategy for problem solving that can be applied to any problem. 3- Figures, sketches, and diagrams to provide a detailed description and reinforcement of what you read. 4- Self-Assessment Tests at the end of each section, with answers so that you can evaluate your progress in learning. 5- Many problems will be discussed and solved in the tutorial classes, which offer working with one or more classmates to exchange ideas and discuss the material.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	5,10	LO # 1, 2. and 3
	Assignments	2	20%(20)	continuous	
	Seminar				
	Report				
Summative assessment	**Midterm Exam**	2 hr.	10%(10)	7	LO 1,2
	Final Exam	3 hr.	50%(50)	16	All

Total assessment	100%(100)marks		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Enthalpy composition diagram.
Week 2	Enthalpy composition diagram.
Week 3	Multi component distillation.
Week 4	Multi component distillation.
Week 5	Extraction, equilibrium data.
Week 6	Number of stages of immiscible solvent extraction.
Week 7	Partially immiscible solvent for triangle diagram.
Week 8	Equipment of solvent extraction.
Week 9	Evaporation, principles.
Week 10	Evaporation theory and calculation.
Week 11	Multi stages Evaporation.
Week 12	Humidification phase equilibrium.
Week 13	Adiabatic saturation, humidity.
Week 14	Cooling tower design and calculation.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

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

Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Text book:** 1- Chemical Engineering Vol.1, Coulson and Richards. **2-** Chemical Engineering Vol.2, Coulson and Richards	yes
Recommended Texts	Treybol, Mass Transfer Operation, 2010	yes
Websites		

APPENDIX:

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

Note:

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

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Petroleum refining processII			**Module Delivery**	
Module Type	Core			☒ **Theory**	
Module Code	PRE323			☐ **Lecture**	
ECTS Credits	8			☒ **Lab**	
SWL (hr/sem)	150			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 3	**Semester of Delivery**	6		
Administering Department	PRE	**College**	PM		
Module Leader	Maher O. Ahmed	**e-mail**			
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Review Committee Approval	1-6-2026	**Version Number**	1		

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	**14. Ability to dehydrate and desalting crude oils.** **15. Ability to heat and distillate crude oils to its products at atmospheric and vacuum pressures.** **16. Ability to produce high octane number gasoline by different processes.** **17. Ability to produce lubricating oils by many processes.**		

	18. **Ability to decrease sulfur content by hydrogenation processes** 19. **Ability to find the best processes and operating conditions to produce petroleum products.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Recognize how Petroleum Refinery works .** **2. List the various terms associated with Refinery Equipments.** **3. Summarize what is meant by a basic Refinery Units** **4. Discuss the reaction and involvement of atoms in Petroleum Industry** **5. Describe Petroleum Fields Processes** **6. Define Processes in Petroleum Industry** **7. Identify the basic elements and their applications.** **8. Discuss the operations of Atmospheric Distillation process.** **9. Discuss the Vacuum Distillation Process** **10. Explain the two main Towers in Petroleum Industry**
Indicative Contents المحتويات الإرشادية	4.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	150	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem)	102	**Unstructured SWL (h/w)**	6.5

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

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**		**10**		
	Assignments		**5**		
	Projects / Lab.		**10**		
	Report		**5**		
Summative assessment	**Midterm Exam**		**20**		
	Final Exam		**50**		
Total assessment			**100**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Product treatment**
Week 2	**Merox Process treatment**
Week 3	**Sulfur production by Claus process**
Week 4	**Adsorpants used in Refineries**
Week 5	**Mimic Diagram**
Week 6	**Asphalt production**
Week 7	**Aromatic production by solvent Extraction**
Week 8	**Refinery Water systems**

Week 9	**Steam water system**
Week 10	**Cooling Water production**
Week 11	**Wastewater Treatment in Refineries**
Week 12	**Storage Tanks in Refineries**
Week 13	**Product Blending**
Week 14	**Emergency Shut Down**
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	**Merox Treatment process**
Week 2	**Aromatic Removal by sovent Extraction**
Week 3	**Adsorption process**
Week 4	**Desulfurization process**
Week 5	**Oil Skimmer**
Week 6	**H2S Removal by Amine Solvents Scrubbing**
Week 7	**Merciptanes Removal from gasoline**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Fundamentals of petroleum refining by Fahim.**	**yes**
Recommended Texts	**1- Petroleum refining engineering by Nelson.** **2-Petroleum refining by Parakash**	yes
Websites	**School of mine in Colorado Website**	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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

Note:

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Catalysts in petroleum refinary**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**PRE324**			☒ **Lecture**	
ECTS Credits	**5**			☐ **Lab**	
SWL (hr/sem)	**125**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 3		**Semester of Delivery**	6	
Administering Department	PRE		**College**	PM	
Module Leader	Dr. Liqaa. I. Saeed		**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Giving the student the necessary information about catalyst for the design and operation of chemical reactors, including Solid catalyzed reactions and the deactivation of catalyst , is the course's main goal. It will discuss topics ranging from fundamentals like the kinetics of homogeneous reactions G/L Reactions on solid catalysts, tickle beds, slurry reactors, and three-phase fluidized beds, the general rate equation, and other design parameters like the rate for independent deactivation, how pore diffusion resistance distorts the kinetics of reactions with deactivating catalysts, performance equations in the regime of strong diffusional resistance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the principles of catalyst, including the reaction with catalyst and chemical reaction equilibrium. 2. Able to preparation the catalyst that need it in petroleum refinery . 3. Ability to deal with rate equation. 4. Ability to deal with all catalyst types and their design for single or multiple. 5.Ability to deal with reactions (reversible, irreversible, series, parallel, etc.). • The skills goals special to the course. This course will provide students with sufficient understanding to convert the information obtained by laboratory into information useful in designing chemical reactors with catalyst that use it in chemical reaction, which will make the most of them in the next phase of designing the reactors and catalyst for the engineering project and thus provide a graduate who is able to design reactors. • Affective and value goals At the end of the course presented, the student will possess all the necessary skills to deal with problems in catalyst .
Indicative Contents المحتويات الإرشادية	1. Heterogeneous Reactions, the Complications of the Rate Equation, contacting patterns for two-phase systems, final thoughts on flow modeling.[4 hrs] 2. Solid catalyzed reactions **:** The spectrum of kinetic regimes, the rate equation for surface kinetics, pore diffusion resistance combined with surface kinetics, single cylindrical pore, first-order reaction, porous catalyst particles, heat effects during reaction, performance equations for reactors containing porous catalyst particles, experimental methods for finding rates, determining controlling resistances and the rate equation, product distribution in multiple reactions[12 hrs]. 3. Autocatalytic reactions , recycle reactor,[4 hrs]. 4. reactors with suspended solid catalyst, fluidized reactors of various types, background information about suspended solids reactors,[4 hrs] 5. Deactivating catalysts: Mechanisms of catalyst deactivation, the rate and performance equations, the rate equation from experiment, batch-solids: determining the rate for independent deactivation, how pore diffusion resistance distorts the kinetics of reactions with deactivating catalysts, performance equations in the regime of strong diffusional resistance,[12 hrs]

	6. G/L Reactions on solid catalysts: Trickle beds, slurry reactors, and three-phase fluidized beds, the general rate equation, performance equations for an excess of reactant b, [4 hrs]. 7. Basics of non-ideal flow (the residence time distribution, RTD)[4hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Presenting the course vocabulary to the students (lectures). 2. Assigning students assignments, such as writing research papers, so that students acquire skills for self-learning and presentation. 3. Conducting sudden exams. 4. Oral exams via e-learning platforms. 5. Conducting the semester and final exams on the specified dates. 6. Informing students of how students' grades are calculated during the semester, their exam results, and discussing failures and successes. 7. Informing students of the curriculum books and auxiliary books that they need in the course vocabulary during a questionnaire for the previous years to improve the curriculum, improve the performance of the teachers, and raise the level of the student.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Heterogeneous Reactions, the Complications of the Rate Equation
Week 2	Solid Catalyzed Reactions **,** The Spectrum of Kinetic Regimes
Week 3	The Rate Equation for Surface Kinetics
Week 4	Pore Diffusion Resistance Combined With Surface Kinetics
Week 5	Porous Catalyst Particles
Week 6	Heat effects during reaction
Week 7	Mid-term Exam + Performance equations for reactors containing porous catalyst particles
Week 8	Autocatalytic reactions , recycle reactor
Week 9	Preparation of heterogeneous catalysts, steps of catalyst preparation
Week 10	G/L Reactions on Solid Catalysts: Trickle Beds, Slurry Reactors, and Three-Phase Fluidized Beds
Week 11	Basics of non-ideal flow (the residence time distribution, RTD)
Week 12	Steady-State Plug Flow Reactors
Week 13	Steady-State Mixed Flow Reactors
Week 14	Reactors with suspended solid catalyst, fluidized reactors of various types
Week 15	Deactivating catalysts, types of catalyst deactivation
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Chemical Reaction Engineering Third Edition Octave Levenspiel	Yes
Recommended Texts	Chemical reactors design by Fogler	Yes
Websites	https://sites.tufts.edu/andrewrosen/files/2013/09/reactor_design_guide1.pdf	

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 DESCRIPTOR FORM

الدراسية المادة وصف نموذج

Module Information **معلومات المادة الدراسية**					
Module Title	Numerical method and optimizing			**Module Delivery**	
Module Type	**S**			• **Theory**	
Module Code	PRE326			• **Lecture**	
ECTS Credits				• **Lab**	
SWL (hr/sem)	100			• **Tutorial** • **Practical** • **Seminar**	
Module Level	3		**Semester of Delivery**	6	
Administering Department	PRE		**College**	PM	
Module Leader	Arqam. B. Younis		**e-mail**		
Module Leader's Acad. Title	Asst. Lecturer.		**Module Leader's Qualification**	MSc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval	1/6/2026		**Version Number**	1	

Relation With Other Modules **الأخرى الدراسية المواد مع العلاقة**			
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 **الدراسية المادة أهداف**	Learn how to use the numerical methods to find the roots and finding the solutions of linear and non-linear algebraic equations and ordinary differential equations, integration, find the great endings and lesser critical points, interpolation and extrapolation, and finally to find the best values (optimization) as another methods beside analytical methods when uses them in petroleum processes.		

Module Learning Outcomes **للمادة التعلم مخرجات الدراسية**	• Education is a broad to understand the impact of engineering solutions globally and economically. • Ability to work in multi groups in engineering majors • The ability to use the techniques, skills and tools of contemporary engineering in the engineering field • The possibility of applying cognitive sciences such as mathematics, pure sciences and engineering. • The possibility of designing and implementing experiments, analyzing of the results and applications. • The ability to solve differential equations for any degree. • The ability to solve the second differential equation (Non linear, Linear by D-operator). • The ability to solve the complex equation by Frobenius method and Bessel equations
Indicative Contents **الإرشادية المحتويات**	• First Order Differential equations (Separable, Homogenous, Exact, Linear, Bernoulli). 12 hrs • Second Order Differential equations (Non linear, Linear, solve by D operator). 16 hrs • Modified equations, Higher order equations, Euler's equation, Simultaneous equations. 12 hrs • Solve differential equations by series method (Frobenius). 8 hrs • Solve differential equations by series method (Bessel function). 8 hrs
Learning and Teaching Strategies **والتعليم التعلم استراتيجيات**	
Strategies	We worked in to divide the students into groups to encourage student's participation in the exercises and discussion during solving the problems. Make a homework concerning the subject of the lectures, and do seminars to present the work.

Student Workload (SWL) **للطالب الدراسي الحمل**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	59	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	4
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	41	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	2.92

Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	100

Module Evaluation **تقييم المادة الدراسية**					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20	6, 14	Q1 for1-5, Q2 for 10-14
	Assignments	2	10	7, 9	Hw.1: 6-7and Hw.2: 8-9
	Projects / Lab.	4	10	continues	
	Report				
Summative assessment	**Midterm Exam**	1	10	9	M. E 1-10
	Final Exam	1	50	16	All
Total assessment					

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
Week	**Material Covered**
Week 1	Find the roots of equations (fixed point method, Newton-Raphson method, bisection method, secant method)
Week 2	Find the roots of equations (fixed point method, Newton-Raphson method, bisection method, secant method)
Week 3	Solution of set of linear equations by (Jacobi method, Gauss-siedel method)
Week 4	nonlinear set of equation (solve by Simple iteration or Gauss –seidel, Newton – Raphson method).
Week 5	Numerical solution of ordinary differential equation (1^{st} order &2^{nd} order, solve by Tayler series, Runge kutaa).
Week 6	Numerical solution of ordinary differential equation (1^{st} order &2^{nd} order, solve by Tayler series, Runge kutaa).

Week 7	interpolation (General Form of Newton's Interpolating Polynomials, Newton's Divided-Difference Interpolating Polynomials).
Week 8	Newton's Divided-Difference Interpolating Polynomials (Non linear, Linear, solve by D operator).
Week 9	Curve fitting (group average, least squar)
Week 10	Curve fitting (group average, least squar)
Week 11	Optimization Techniques (Optimization Terminologies: Objective Function, Decision Variable, Constraint).
Week 12	Mathematical Modelling of Optimization Problem (Linear Programing, nonlinear Programing).
Week 13	Multivariable Optimization with Inequality Constraints Optimization Techniques Introduction Numerical Optimization Techniques (Elimination Methods, Fibonacci method, Golden section method, Interpolation Methods, Newton Method).
Week 14	Multivariable Optimization with Inequality Constraints Optimization Techniques Introduction Numerical Optimization Techniques (Elimination Methods , Fibonacci method , Golden section method , Interpolation Methods , Newton Method).
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
Week	**Material Covered**
Week 1	Find the roots of equations by Excel and Matlab
Week 2	Solution of set of linear equations by Excel and Matlab
Week 3	Numerical solution of ordinary differential equation by Excel and Matlab
Week 4	interpolation by Excel and Matlab
Week 5	Curve fitting by Excel and Matlab
Week 6	Find maximum and minimum of Linear Programing by Excel and Matlab
Week 7	Find maximum and minimum of Linear Programing by Excel and Matlab

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Learning and Teaching Resources والتدريس التعلم مصادر		
	Text	**Available in the Library?**
Required Texts	Numerical analysis using MATLAB and spreadsheets /Steven T.Karris.	- Numerical method for scientists and engineering K. Sankara.Rao
Recommended Texts	- Numerical method in engineering practice, Al Khafaji.	
Websites		

APPENDIX:

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

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

1. Course Name:
Reservoir Management and Petroleum Economics
2. Course Code:
3. Semester / Year:
Fourth academic year - 2022-2023
4. Description Preparation Date:
2024-9-1
5. Available Attendance Forms:
3 hours in attendance
6. Number of Credit Hours (Total) / Number of Units (Total):
90 hr/ 4 units
7. Course administrator's name (mention all, if more than one name)
Name: Zahraa Ghanim younis Al-alaf Email: zahraaalmajidi@uomosul.edu.iq
8. Course Objectives

Course Objectives	**1. Explain the nature of the petroleum economy and the most important related concepts.** **2. Explore the origins of petroleum and the theories explaining its existence.** **3. Explain the types of oil and their measurements.** **4. Understand the stages of the petroleum industry.** **5. Learn about reserves, storage, oil markets, and prices.** **6. The most important policies, theories, and strategies related to the depletable resource.** **7. Learn about and study licensing rounds.** **8. Contracting with companies, how to write petroleum contracts, and dealing with banks.**

9. Teaching and Learning Strategies	
Strategy	Delivering the lecture, adopting the discussion and explorati method, using modern methods to clarify the lecture, brainstormi and using educational videos.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	٣	Basic Concepts	Definition of oil, its history, and origin	Theoretical	General Questions and Discussion
Second	٣	Identify Types of Oil	Types of oil, its scale, and density	Theoretical	Homework
Third	٣	Importance of the Oil Economy	Definition of petroleum economics	Theoretical	General Questions and Discussion
Fourth	٣	Characteristics of the Oil Industry	The petroleum industry and its characteristics	Theoretical	Homework
Fifth	٣	Understand Horizontal and Vertical Integration of the Oil Industry	Stages of the petroleum industry	Theoretical	Homework
Sixth	٣	Extractive Industry	Source	Theoretical	Homework
Seventh	٣	Processing Industry	Destination	Theoretical	General Questions and Discussion

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Eighth	۳	Importance of Reserves and Influencing Factors	Oil reserves and their classification	Theoretical	On-the-Go Exam
Ninth	۳	Understand Product Behavior	Reserves and the critical path for extraction	Theoretical and Exercises	Homework
Tenth	۳	Depleting Resource Cycle	Hibert's study	Theoretical	General Questions and Discussion
Eleventh	۳	Importance of Inventory and Influencing Factors	Types of oil storage and their impact on oil price fluctuations	Theoretical	General Questions and Discussion
Twelfth	۳	Importance of Inventory and Influencing Factors	Types of oil storage and their impact on oil price fluctuations	Theoretical	Homework
Thirteenth	۳	Oil Market	Global oil prices	Theoretical	Homework
Fourteenth	۳	Oil Market	Global oil prices	Theoretical	
Fifteenth	End-of-Semester Exam	End-of-Semester Exam	Theoretical	Exam	
Sixteenth	۳	Review	Review	Theoretical	Homework
Seventeenth	۳	Seminar on Economic Feasibility for Engineering Projects		Project Presentation	
Eighteenth	۳	Economic Feasibility for		Project Presentation	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
		Engineering Projects Seminar			
Nineteenth	۳	Licensing Rounds	Theoretical	Theoretical	Homework
Twenty	۳	Licensing Rounds	Theoretical	Theoretical	Homework
Twenty-One	۳	Licensing Rounds	Theoretical	Theoretical	Homework
Twenty-Two	۳	OPEC Policy	OPEC and the Production Quota System	Project Presentation	Homework
Twenty-Three	۳	OPEC Policy	OPEC and the Production Quota System	Project Presentation	
Twenty-Four	۳	Presentation of a Seminar on How to Deal with Oil Markets		Exam	
Twenty-Five	۳	Presentation of a Seminar on How to Deal with Oil Markets		Theoretical	
Twenty-Six	۳	Second Semester Exam		Theoretical	
Twenty-Seven	۳	Natural Gas and Oil Fields		Review	
Twenty-Eight	۳	Natural Gas and Oil Fields			
Twenty-Nine	۳	Review			
Thirty	۳				Final Exam

11. Course Evaluation

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1.Midterm Exam: 15 2. Core Exams: 5 3. Oral Questions and Direct Assessment: 10 4. Classroom Participation: 5 5. Activity Presentations: 5 6. Final Exam: 60					

12. Learning and Teaching Resources

Required textbooks (curricu books, if any)	١.د.احمد حسين الهيتي، مقدمة في اقتصاديات النفط، مطبعة جامعة الموصل، ١٩٩٤.
Main references (sources)	١. د. احمد حسين الهيتي، اقتصاديات النفط، مطبعة جامعة الموصل، ٢٠٠٠. ٢.Electronic lectures by Professor Hussein Rabia
Recommended books and references (scientific journals, reports…)	https://sa.investing.com/commodities/brent-oil https://sa.investing.com/commodities/crude-oil
Electronic Referenc Websites	٥٪

1. Course Name:
Enhanced oil Recovery
2. Course Code:
PRE407
3. Semester / Year:
4th stage
4. Description Preparation Date:
25-9-2024
5. Available Attendance Forms:
Attendance time for students
6. Number of Credit Hours (Total) / Number of Units (Total)
(60)/(4)
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Majid Majdi Abdel Al- Majeed Al-Mutwali Email: majidmutwaly@uomosul.edu.iq

8. Course Objectives	
Course Objectives	It aims to teach the student everything related to methods for improving oil production (primary, secondary and tert methods), which include injection liquids, gases or chemicals and everything related to these methods for the purpose of obtaining the highest possible oil production from oil fields.

9. Teaching and Learning Strategies	
Strategy	Identify the most important methods used to improve oil production from low-production fields • Study and understand everything related to these methods, according to the nature of each oil field • Raising the ability of the petroleum engineer to think about the nature of using means to improve production • Knowing the conditions affecting the field during the injection of liquids, gases, or chemicals

	A complete understanding of production ratios before and after using production improvement methods.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	2	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Oil recovery processes Primary oil recovery	theoretical	General Question and discussion
2nd 3rd	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Principal influences on efficiency of enhanced Recovery	Theoretical	General Question and discussion
4th-5th	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Secondary oil recovery Injection well location	theoretical	General Question and discussion
6th 7th	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Oil displacement efficien Water injection	Theoretical	General Question and discussion
8th 9th	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Optimum time to waterfl Practical considerations water injection projects	theoretical	General Question and discussion
10+11	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Displacement mechanisı	Theoretical	General Question and discussion
12+13	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Water injection in regul developed homogene reservoirs	theoretical	General Question and discussion
14+15	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Water injection performa calculations	Theoretical	General Question and discussion

16+17	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Production well completi Treatment methods	theoretical	General Question and discussion
18+19	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Combined gas and water injection	Theoretical	General Question and discussion
20+21	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Gas recycling in condensate reservoirs	theoretical	General Question and discussion
22	2	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	The thermodynamics of recycling	Theoretical	General Question and discussion
23+24	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Sweep efficiency	theoretical	General Question and discussion
25+26	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Well locations	Theoretical	General Question and discussion
27+28	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Production control	theoretical	General Question and discussion
29+30	4	Raise the student's abilit to improve oil recovery primary, secondary and Tertiary methods	Polymers for Enhanced Oil Recovery Technology	theoretical	General Question and discussion

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

Main references (sources)	Enhanced Oil Recove 1980:Marcel Latil, Charles Bardon, Jacques Bur and Pierre Sourieau , Institut Francais Du Petrole , 23
Recommended books and references (scientific journals, reports…)	*Alvarado, V. and Manrique,* 'Enhanced Oil Recovery: An Upda Review', *Energies, 3 (2010), 152 1575*
Curriculum/Description Update Rate:	٪٦

Course Name:
Engineering design
13. Course Code:
PRE406
14. Year:
4
15. Description Preparation Date:
25/9/2024
16.Available Attendance Forms:
17.Number of Credit Hours (Total) / Number of Units (Total)
١٠٠/٤
18. Course administrator's name (mention all, if more than one name)
Maher Obaid Ahmed,
19. Course Objectives

Course Objectives	23. To develop solving skills and an understanding of design for p

	24. To understand the pumps, piping systems and relation of volu 25. This course deals with the basic concept of engineering desig 26. It deals with Tanks, Vessels & Drums – Sizing, Gas Liquids Sep 27. To understand petroleum unit's equations problems. 28. To understand the calculation of engineering design for petro

20. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module; Encourage students' participation in the exercises, while at the same tim This will be achieved through classes, interactive tutorials, the displayin

21. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name
١			Introduction to design
١	٤		Design Information and Data
٢	٤		Pumps & Piping Systems:
٣			1: Valve selection. 2- Pipe size selection.3-Opt
٤		General information	pipe diameter. 4- Pipe Wall thickness.
٥			Tanks, Vessels & Drums – Sizing.
٦			Gas Liquids Separators (horizontal and ve
٧			separator)
٨		Fundamental design	Heat-Transfer Equipment: Heat Exchanger Des
٩			Separation column: Continuous Distillation (Va
١٠			Liquid Equilibrium, Flash or equilibrium distilla
١١		Advance desing	The McCabe-Thiele Method.
١٢			Calculation of the theoretical number of plates
١٣			continuous distillation column by McCabe-T
١٤			Method (graphically), Minimum Reflux
١٥			Minimum number of stages).
			Exam.

22. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

23. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Coulson & Richardson's CHEMICAL ENGINEERING VOLUME 6.
Main references (sources)	Handbook of Pumps and Pumping: Pumping Manual International by Brian Nesbitt.
Recommended books and references (scientific journals, reports…)	Fluid Mechanics, Heat Transfer, and Mass Transfer: Chemical Engineering Practice 1st Edition by K. S. Raju
Electronic References, Websites	https://sakura03.files.wordpress.com/2012/03 hemical_engineering_design_fourth_edition_chem
Curriculum/Description Update Rate:	٪٨

1. Course Name:	
Petroleum Production Engineering 2	
2. Course Code:	
PRE 402	
3. Semester / Year:	
First and Second/ Fourth	
4. Description Preparation Date:	
25/9/2024	
5. Available Attendance Forms:	
In-person attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
٦/١٢٠	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Muhamad A. Jassim Email: muhamed.aswad@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	**•Teaching the student the basics of petroleum production engineering 2…..** **•Knowing the reservoir pressure and its relationship to production.** **• Draw the IPR shape** **•Mathematical methods for calculating production coefficients…..**
9. Teaching and Learning Strategies	
Strategy	Acquire the scientific concepts and foundations that can distinguish the student as a petroleum production engineer II, identify the most important mathematical methods for calculating the productivity factor and study its impact on the PR diagram, as well as identify the most important problems facing petroleum engineers in terms of pressure

	drop during the production process.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	3	**Types Reservoirs**	**Petroleum Production Engineering II**	Theory	General questions and discussion
Second and third	6	**Productivity Index (PI)**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussion exam
Fourth	3	**Radial flow in the reservoirs**	**Petroleum Production Engineering II**	Theory	General questions and discussi
Fifth and Sixth	6	**Inflow performance Relationship (IPR)**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussi
Seventh	3	**Effect of Stratification and water cut on IPR**	**Petroleum Production Engineering II**	Theory	General questions and discussi
Eighth	3	**Productivity index test**	**Petroleum Production Engineering II**	Theory	General questions and discussi
Ninth and tenth	6	**Vogel Method**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussion
Eleventh and twelfth	6	**Standing Method**	**Petroleum Production EngineeringII**	Theoretical& Practical	General questions and discussion

thirteenth and fourteent	6	**Couto Method**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussion
Fifteenth and sixteentl	6	**Sadoon Metho**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussion
seventeenth nd eighteenth	6	**Fetkovich Method**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussi
nineteenth and twentietl	6	**Mathematical and physical principles of pressure drop**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussi
twenty-first and twen second	6	**Flow pattern and its relation with pressure**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussi
twenty-third and twen fourth	6	**Multi rates test**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussi
twenty-fifth and twen sixth	6	**Build up test**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussi
twenty-sever and twen eighth	6	**Draw down test**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussi
twenty-ninth and thirtieth	6	**Stimulation operations**	**Petroleum Production Engineering II**	Theoretical& Practical	General questions and discussion

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Petroleum Reservoir Engineering Handbook, T Ahmed, 4th edition 2010
Main references (sources)	Petroleum Production Engineering
Recommended books and references (scientific journals, reports…)	Principles of Petroleum Producti Engineering 1
Electronic References, Websites	8%

1.Course Title and Academic Level: Petroleum Pollution
2. Course Code: *PRE401*
3. Semester / Academic Year: Annual
4. Date of Description Preparation: September 1, 2024
5. Available Attendance Modes: In-person Attendance
6. Total Credit Hours / Units: 4 total hours / 2 credit units
7.Course Coordinator Name and Academic Title (if more than one, all should be listed):
Course Coordinator: Dr. Liqaa Majdal – l.ides.saaed@uomosul.edu.iq

8. Course Objectives

Course Objectives (Specialized for Petroleum Engineering Students) This course is designed to equip petroleum engineering students with a comprehensive and application-oriented understanding of pollution challenges arising specifically from petroleum operations. The course will: • Critically examine the **sources, classifications, and chemical behaviors of petroleum-derived pollutants** across upstream, midstream, and downstream operations. • Analyze the **short- and long-term environmental and public health impacts** of petroleum contamination with a focus on high-risk zones such as refineries, pipelines, and offshore platforms. • Investigate **remediation technologies and engineering controls** used to treat petroleum-contaminated media (water, air, and soil), emphasizing their design principles and operational challenges. • Evaluate **mitigation strategies, industry-specific regulations, and environmental compliance frameworks** applicable to the	

petroleum sector, both in Iraq and globally.

9. Teaching and Learning Strategies:

To support experiential and systems-level learning, this course employs:

- **Technical lectures** grounded in environmental chemistry, petroleum processing, and contamination modeling.
- **Multimedia case simulations and 3D visualizations** to illustrate spill dynamics, leak propagation, and cleanup methodologies in real-world petroleum sites.
- **Problem-solving workshops and team-based discussions** on case scenarios drawn from major oil-producing regions.
- **Field visits** to refineries, water treatment plants, or contaminated industrial zones for first-hand observation and sampling technique training.
- **Capstone-style student projects** focused on pollution control solutions specific to Iraq's petroleum infrastructure.

10. Course Structure

Week	Hours	Learning Outcome	Topic	Method	Assessment
1	2	Define petroleum pollution scope in engineering context	Intro to Petroleum Pollution	Lecture	Diagnostic Quiz
2	2	Identify major emission/discharge sources in oil operations	Sources of Pollution	Lecture	Class Participation
3	2	Distinguish between types of pollutants and their physical forms	Classification of Petroleum Pollutants	Lecture + Video	Quiz
4	2	Map pollution risks across the petroleum lifecycle	Life Cycle of Petroleum Contamination	Lecture	Homework
5	2	Assess spill scenarios and marine oil dispersion	Water Pollution & Oil Spills	Lecture + Case Study	Quiz
6	2	Evaluate gas emissions from combustion and venting operations	Air Pollution and Gaseous Emissions	Lecture	Report

7	2	Analyze soil permeability and hydrocarbon retention	Soil Contamination Mechanisms	Lecture + Presentation	Quiz
8	2	Implement field sampling for soil and water testing	Environmental Sampling and Analysis	Lab Activity	Practical Evaluation
9	2	Assess toxicity and exposure pathways	Environmental and Health Impacts	Lecture + Discussion	Report
10	2	Understand ISO, EPA, and local regulatory mechanisms	Pollution Regulations and Compliance	Lecture	Quiz
11	2	Describe microbial remediation in petroleum contexts	Bioremediation Technologies	Lecture	Quiz
12	2	Compare adsorption, filtration, oxidation, and other methods	Cleanup Techniques	Lecture + Practice	Homework
13	2	Evaluate membrane, thermal, and chemical advanced processes	Advanced Remediation Technologies	Lecture	Quiz
14	2	Review emergency oil spill response planning	Oil Spill Management	Lecture + Case Study	Theoretical Assessment
15	2	Learn environmental data logging and remote sensing	Monitoring and Data Logging	Lecture	Quiz
16	2	Create site-specific control and mitigation plans	Pollution Control Planning	Lecture	Homework
17	2	Study waste stream management in production fields and refineries	Waste Handling and Disposal	Lecture + Video	Quiz
18	2	Analyze major international case studies	Global Case Studies	Group Discussion	Report
19	2	Discuss regulatory influence of NGOs	NGO Roles and Environmental Policy	Lecture	Quiz
20	2	Critique sustainability frameworks in oil operations	Sustainable Practices	Presentation	Group Evaluation
21	2	Apply concepts to localized industry scenarios	Case Studies in Iraq	Group Work	Homework
22	2	Reflect on ethical decision-making in petroleum pollution cases	Ethics in Environmental Management	Lecture	Quiz
23	2	Analyze accidents (e.g., Exxon Valdez, Deepwater Horizon)	Major Spill Events	Lecture + Case Study	Report
24	2	Develop site emergency and safety plans	Emergency Preparedness	Discussion + Presentation	Oral Evaluation
25	2	Introduce breakthrough technologies in green oil engineering	Emerging Clean Technologies	Lecture	Quiz
26	2	Explore long-term challenges (e.g., carbon intensity, ESG)	Future Challenges in Pollution Control	Lecture	Research Assignment
27	2	Predict regulatory and technological trends	Environmental Forecasting	Forecasting Discussion	Partial Final Exam

28	2	Use AI-driven risk models for remediation decision-making	Machine Learning for Risk Assessment	Review Session	Report
29	2	Prepare professional portfolios	Careers in Environmental Protection	Workshop + Discussion	Final Evaluation
30	2	Compare AI-based monitoring vs traditional methods	AI in Monitoring and Leak Detection Systems	Presentation	Group Discussion

11. Course Assessment and Grading Breakdown

The total score (out of 100) is distributed based on the student's assigned tasks, including daily preparation, quizzes, oral and written exams, monthly tests, reports, and other activities, as follows:

- **Attendance and Participation**: 10%
- **Midterm Assessments** (daily, monthly, oral): 20%
- **Reports and Practical Projects**: 10%
- **Final Exam**: 60%

12. Learning and Teaching Resources

Prescribed Textbooks (Core Curriculum, if applicable)	Nelson, L. (2020), Environmental Pollution Control in Petroleum Operations.
Primary References (Sources)	
Recommended Supporting Books and References (Scientific journals, reports, etc.)	• Jafarinejad, Shahryar. Petroleum waste treatment and pollution control. Butterworth-Heinemann, 2016. • Fingas, M. (2016), Oil Spill Science and Technology. • Tchobanoglous, G. & Kreith, F. (2017), Handbook of Solid Waste Management.
Electronic References and Websites	
Curriculum/Description Update Rate:	10%

1. Course Name:
Reservoir Modeling and Simulation
2. Course Code:
PRE403
3. Semester / Year:
Year– Forth level
4. Description Preparation Date:
9/9/2024
5. Available Attendance Forms:
Attendance+Classroom
6. Number of Credit Hours (Total) / Number of Units (Total):
6/120
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr.Nabhan Abdulkareem Hamdon Email: nabhanabdul@uomosul.edu.iq
8. Course Objectives

Course Objectives	• **Reservoir Characterization.** • **Fluid behavior and rock properties.** • **Grid Design.** • **Principles of Finite Difference.** • **Application of Finite Difference (Summary Various Finite Difference, Discretization o Single Phase System, Block–Centered and Po Centered Grids, Dirichlet and Neuma Boundary Conditions.** • **Derivative the partial differential equations t governing the flow in porous media.** • **Solving numerically the partial differen equations that governing the flow in por media.** • **How this course deals with the basic concep reservoir engineering, Physics, Compu programing and numerical solution.**

9. Teaching and Learning Strategies

Strategy	Strategies of reservoir simulation: Reservoir simulation is a crucial tool in the oil and gas industry for predicting behavior and performance of hydrocarbon reservoirs. It involves creat numerical models of the subsurface reservoir and simulating fluid flow understand how the reservoir will respond to production strategies. Deliver this module is to encourage students' participation in the exercises, while at same time refining and expanding their critical thinking skills. This will achieved through classes, interactive tutorials and by considering types of sim experiments involving some sampling activities that are interesting to the stude and to encourage students' participation in the exercises, while at the same ti refining and expanding their critical thinking skills. This will be achieved throu classes, interactive tutorials and by considering types of simple experime involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours /week	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	**2**		**Introduction to Reservoir Modelling and Simulation (Defintions)**	**Attendance**	**General questions a discussion**
Week 2			**Geological Model: A detailed description of the reservoir's geology, including its structure, lithology, and stratigraph**	**Attendance**	**General questions a discussion**
Week 3			**Petrophysical Properties: Important rock and fluid properties such as porosity, permeability, saturation, and compressibility.**	**Attendance**	**General questions a discussion**
Week 4			**Fluid Properties: Properties of the fluids present in the reservoir, including**	**Attendance**	**General questions a discussion + quiz**

			oil, gas, and water(part 1)		
Week 5			**Fluid Properties: Properties of the fluids present in the reservoir, including oil, gas, and water(part 2)**	**Attendance +Classroom**	**General questions a discussion**
Week 6			**Basic Equations of Fluid Flow in Porous Media (Part 1)**	**Attendance**	**Exam**
Week 7			**Basic Equations of Fluid Flow in Porous Media (Part 2)**	**Attendance +Classroom**	**General questions a discussion**
Week 8			**Principles of Finite Difference Approximation (Finite Difference Scheme & Discretization) (Part 1)**	**Attendance**	**General questions a discussion + quiz**
Week 9			**Principles of Finite Difference Approximation (Finite Difference Scheme & Discretization) (Part 2)**	**Attendance**	**Exam**
Week 10			**Methods of Solving Systems of Linear Equations**	**Attendance**	**General questions a discussion**
Week 11			**Introduction to Types of Boundary Conditions and Grid Systems**	**Attendance**	**General questions a discussion+ quiz**
Week 12			**Simple 1D Linear Flow with Sources/Sinks (part 1)**	**Attendance +Classroom**	**Exam**
Week 13			**Simple 1D Linear Flow with**	**Attendance**	**General questions a discussion**

			Sources/Sinks (part 2)		
Week 14			**Introduction to the numerical simulation of multi-phase flow through porous media (Part 1)**	**Attendance +Classroom**	**General discussion a Preparatory week before the Mid. Exa**
Week 15			**Mid. Exam**	**Attendance**	**Exam.**
Week 16			**Introduction to the numerical simulation of multi-phase flow through porous media (Part 2)**	**Attendance**	**General questions ar discussion**
Week 17			**Dervative of 2D-Cartesian flow equation (part 1)**	**Attendance +Classroom**	**General questions and discussion**
Week 18			**Dervative of 2D Cartesian flow equation (part 2)**	**Attendance**	**General questions and discussion**
Week 19			**Boundary Conditions and Grid Systems (part 1)**	**Attendance**	**General questions and discussion+ quiz**
Week 20			**Boundary Conditions and Grid Systems (part 2)**	**Attendance**	**General questions and discussion**
Week 21			**Dervative of 3D-Cartesian flow equation (part 1)**	**Attendance +Classroom**	**Discussion +Exam**
Week 22			**Dervative of 3D-Cartesian flow equation (part 2)**	**Attendance**	**General questions and discussion+ quiz**
Week 23			**Dervative of 3D-Cartesian flow equation (part 3)**	**Attendance**	**General questions and discussion**
Week 24			**Numerical simulation of a 3D-fluid flow equ.**	**Attendance +Classroom**	**Discussion +Exam**

			through porous media (Part 1)		
Week 25			**Numerical simulation of a 3D-fluid flow equ. through porous media (Part 2)**	**Attendance**	**General questions and discussion+ quiz**
Week 26			**Numerical simulation of a 3D-fluid flow equ. through porous media (part 3)**	**Attendance**	**General questions and discussion**
Week 27			**Introduction to the numerical simulation of multi-phase flow through porous media (Part 1)**	**Attendance +Classroom**	**Discussion +Exam**
Week 28			**Introduction to the numerical simulation of multi-phase flow through porous media (Part 2)**	**Attendance**	**General questions and discussion**
Week 29			**Preparatory week before the final Exam**	**Attendance**	**Preparatory week before the final Exam**
Week 30			**Final Exam.**	**Attendance**	**Final Exam**