كلية شط العرب الجامعة

قسم هندسة تقنيات الوقود والطاقة

وصف المواد الدراسية

مسار بولونيا

وصف المواد الدراسية

المرحلة الاولى

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Analytical chemistry			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	7				
SWL (hr/sem)	210				
Module Level		1	**Semester of Delivery**		one
Administering Department		Fuel and Energy Technologies Engineering Department	**College**	Shatt Al-Arab University College	
Module Leader	Murtada Firass Hassan		**e-mail**	Murtada.Firass@sa-uc.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		Analytical Chemistry
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	None		**Semester**		
Co-requisites module	None		**Semester**		

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introduction to Analytical Chemistry with a goal of teaching the reason for doing analytical 2. Chemistry and the basic steps of dealing with analytical issues present for a professional chemist. 3. Later the curriculum develops to learning the main units in regard to analytical chemistry and the relations between them and the ability to exchange them. Introducing students to the basic concepts related to descriptive analysis methods 4. Focusing on the method of sedimentation of elements in descriptive analytical chemistry and calculating their quantities
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: A- Cognitive goals . A1. Introduce students to the basic concepts related to descriptive analytical chemistry A2. Increasing awareness and educating students by solving problems related to segregation and sedimentation methods. B. The skills goals special to the course. B1. practical skills B2. Analytical and inferential skills B3. Development skills C- Knowledge and Understanding Introduce basic definitions and Introductory concepts of analytical chemistry. D. Show the different methods to prepare solutions with different concentrations and PH.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. introduction to main definitions for volumetric and gravimetric analysis 2. introduction to solubility and common ion effect. 3. Enabling students to solve problems related to the intellectual framework of the lecture material. 4. Enabling students to think intellectual questions from the lecture material 5. Linking the lecture curriculum with practical applications, especially with ou daily life.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Providing students with the basics and additional topics related to thinking outcomes Discussing the topics of the lesson that require thinking and analys 2. Raising a set of thinking questions during the lectures, which increases and motivates students to analyze and conclud 3. Giving students homework that requires self-explanation 4. Assessment methods I. Oral exams for the previous lecture II. Participation scores for competition questions related to the subject III. Specific grades for homework IV. - Semester exams

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	116	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	94	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	210		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,6, 9,12	
	Assignments	2	10% (10)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report/ Lab.	1	10% (10)	14	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	
	Final Exam	4 hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic concept of qualitative and quantitative analysis
Week 2	Qualitative and quantitative analytical method and concentrations
Week 3	Principals of quantitative gravimetric analysis
Week 4	Stoichiometric of chemical analysis
Week 5	Chemical equilibrium and Chemical solubility
Week 6	Reactions of acids, bases
Week 7	pH for the acidic solutions
Week 8	Buffer solution
Week 9	Equilibrium in the precipitation, solubility, precipitation and partial precipitation.
Week 10	Equilibrium in the oxidation and reduction reactions, equations of oxidation and reduction, indicators of oxidation and reduction.
Week 11	Complex formation
Week 12	Drawing of reaction curves in aqueous solution, construction of titration curves of aqueous solutions
Week 13,14	Methods and principles of spectrometric analysis
Week 15	Instrumental analysis for industry
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Safety in laboratory, laboratory tool , How to write a scientific report
Week 2,3	Measurement of the density by pycnometer and hydrometer
Week 4	Measure the melting point of compounds

Week 5	boiling point of compounds
Week 6,7	Recrystallization.
Week 8,9	TITRATION
Week 10	molarity
Week 10.11	normality
Week 11,12	pH Strong Acid, Strong Base, Salt of Strong A,cid and Strong Base
Week 13	solubility
Week14	Preparatory week before the final Exam
Week15	final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	-Analytical chemistry, skoog 2nd edition Fundamentals of analytical chemistry, skoog 8th edition Fundamentals of Analytical Chemistry 9e by Douglas A. Skoog"	yes
Recommended Texts	Flaschka. Quantitive Analytical Chemistry	no
Websites	http://www.acs.org/content/acs/en.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	**Mathematics1**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**6**				
SWL (hr/sem)	**180**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Fuel and Energy Technologies Engineering Department		**College**	Shatt Al-Arab University College	
Module Leader	Zahraa Ahmmad Nadeem		**e-mail**	Zahraa.Ahmmad@sa-uc.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Ms.C	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics (2)	**Semester**	2
	Mathematics (3)		3

	Engineering Analysis		5
	Numerical method		6
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. Recognize that mathematics permeates the world around us 2. Appreciate the usefulness, power and beauty of mathematics 3. Enjoy mathematics and develop patience and persistence when solving problems 4. Understand and be able to use the language, symbols and notation of mathematics 5. Develop mathematical curiosity and use inductive and deductive reasoning when solving problems 6. Become confident in using mathematics to analyses and solve problems both in school and in real-life situations 7. Develop the knowledge, skills and attitudes necessary to pursue further studies in mathematics 8. Develop abstract, logical and critical thinking and the ability to reflect critically upon their work and the work of others 9. Develop a critical appreciation of the use of information and communication technology in mathematics 10. Appreciate the international dimension of mathematics and its multicultural and historical perspectives.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Determinants and Grammar's rule 2. Trigonometric functions & relation Graphing of functions 3. Vectors. 4. Function of limits 5. Types of function
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to analytic geometry [12hr]. 2. Matrix and determinations [12hr]. 3. Vectors[12hr]. 4. Functions [24hr]. 5. Limits and continuity [24hr].

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 examples involving some solving methods that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to analytic geometry The coordinate plan and straight lines: 1. Cartesian coordinates. 2. Slopes of line. 3. Slopes of non-vertical lines.
Week 2	Equations for lines, distance formula, and circle.
Week 3	Matrices and determents: 1. Symbols of matrix, order, types of matrices and operations of matrix (+,/, -, *).
Week 4	Determinations: definitions, order, properties of determinations, and Gramer's rule.
Week 5	Vectors: vector components, multiplication of a vector by scalar, vectors in X-Y plan, subtraction of vectors, and length of vector.
Week 6	Vectors: Unit vector, vector in space, sphere, two vector in (X-Y-Z) planes, product of vectors, and calculation of geometric area using vectors.
Week 7	Functions: Types of functions 1. Algebraic functions:(linear function, polynomial function, constant function and absolute value function) 2. Transcendental functions: trigonometric functions, properties of trigonometric functions, and the invers trigonometric functions.
Week 8	Exponential function, properties of the exponential function, and graph of exponential function.
Week 9	Logarithmic function, properties of the Logarithmic function, and graph of Logarithmic function.
Week 10	Hyperbolic trigonometric function, properties of the Hyperbolic trigonometric function, and invers of Logarithmic function.
Week 11	Limits: theorems of limits, sandwich theorem, and infinity as a limit.
Week 12	Continuity: continuity at an interior point, continuity at an end point.
Week 13	The continuity test: theorem II and theorem III.
Week 14	Applications: Velocity and acceleration and other rates of change.
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Ayres, F., & Mendelson, E. (2009). Calculus: Schaum's outlines.	yes
	G. Thomas & R. Finney, :Calculus and analytic Geometry.	
Recommended Texts	G. Stephenson: Mathematical Methods for Science Students. Longman hous,1981.	No
Websites	https://canterbury.libguides.com/math/websites	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Drawing			**Module Delivery**	
Module Type	B			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	4				
SWL (hr/sem)	120				
Module Level			**Semester of Delivery**		
Administering Department	Fuel and Energy Technologies Engineering Department		**College**	Shatt Al-Arab University College	
Module Leader	Maha Munadhil Salmman		**e-mail**	Maha.Munadhil@sa-uc.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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. This module describes the skills, knowledge, and attitude required to apply technical drawing. At the end of this module, learners will be able to Introduce technical drawings, apply principles of drawing, and project views. 2. to make the students know how to draw (Engineering Drawing) by using AUTOCAD program. 3. This course deals with the basic concept of Engineering Drawing. 4. Define the Engineering Drawing - The Tools used in Engineering Drawing - Types of drawing sheets, types of lines. 5.Learning 2D interface in AutoCAD. 6. Learning 3D interface in AutoCAD.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Define the Engineering Drawing - The Tools used in Engineering Drawing - Types of drawing sheets, types of lines 2-Introduction to AutoCAD and learning how to use the program interface 3-Learning how to use Draw toolbar and its content 4-Learning how to use modify toolbar and its content 5-Learning how to use dimension toolbar and its content and draw 2D exercises 6-Theory of projection, Theory of projection 1st angle 7-Theory of projection 3rd angle 7-Drawing the three projection views 8-Theory of Section and Drawing the three Section views 9-Learning 3D interface in AutoCAD and 3D tools, 3D exercises

Indicative Contents المحتويات الإرشادية	indicative contents include the following: Part A: The Purpose of Engineering Drawings An engineering drawing is a subcategory of technical drawings. The purpose is to convey all the information necessary for manufacturing a product or a part. Engineering drawings use standardized language and symbols. This makes understanding the drawings simple with little to no personal interpretation possibilities. Part B: understanding AutoCAD AutoCAD interface and Its usage like centers around drawing with electronic equivalents of real-life drafting tools. The added support of digital precision helps with measurements and calculations, 3D components, and data sharing. Part C: 2D Drawings Using lines to make 2D drawings, apply dimensions rules, design 2d shapes and drawing projections and sectioning views. Part D: 3D drawings 3D CAD, or three-dimensional computer-aided design, is technology for design and technical documentation, which replaces manual drafting with an automated process.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to courage 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. YouTube channel for the teacher includes lessons to help the students in their studying https://www.youtube.com/channel/UCiUmlY4CLQn5ycY4von1P5g

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

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

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Define the Engineering Drawing - The Tools used in Engineering Drawing - Types of drawing sheets, types of lines
Week 2	Introduction to AutoCAD and learning how to use the program interface
Week 3	Learning how to use Draw toolbar and its content

Week 4	Learning how to use Draw toolbar and its content
Week 5	Learning how to use modify toolbar and its content
Week 6	Learning how to use dimension toolbar and its content and draw 2D exercises
Week 7	Theory of projection, Theory of projection 1st angle
Week 8	Find the 3rd project view from 2 views
Week 9	Theory of projection 3rd angle
Week 10	Drawing the three projection views
Week 11	Theory of Section
Week 12	Drawing the three Section views
Week 13	Learning 3D interface in AutoCAD
Week 14	3D tools, 3D exercises
Week 15	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	ملزمة الرسم الهندسي الخاصه بالكلية التقنية الهندسية بغداد/ قسم هندسة تقنيات المواد	yes
Recommended Texts	K. Venkata Reddy “Textbook of Engineering Drawing second edition” 2008	No
Websites	https://www.autodesk.com/	

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 Utilization 1			**Module Delivery**	
Module Type	S			**Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	4				
SWL (hr/sem)	120				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		Fuel and Energy Technologies Engineering	**College**	Shatt Al-Arab University College	
Module Leader	Ali Ahmmad AbdulAmmer		**e-mail**	Ali.Ahmmad@sa-uc.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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	Visual Basic The structure of VB is designed to allow programmers to use the environment to write executable files (exe files). Also, using VB, developers can create programs that can be utilized as a front end to databases. VB tools can help programmers develop applications or complete software while still allowing them to modify and revise their work accordingly. VB enables the rapid development of Windows based applications while also assisting in the access of databases by using ActiveX data objects (ADO) while allowing programmers to use ActiveX control and various objects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the module, students will be able to: For visual basic • Creation of the interface; • Creation of codes in the graphical environment; • The quick development of application; • Support in the development of games (commonly limited); • Easy to understand and use; • Very flexible and convenient.
Indicative Contents المحتويات الإرشادية	The following is a list of topics that will be covered during this module: In a Visual Basic course, students might learn about the user interface, language syntax, program structure, and implementation of the programming language. The objective of such a course is to learn to create and use applications. To find out more about what a Visual Basic programming course teaches, read on.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to courage 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	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10%	2, 5, 9, 12	
	Assignments	1	10%		
	Projects / Lab.	1	10%	13	
	Report	1	10%		
Summative assessment	**Midterm Exam**	1hr	20%	7	
	Final Exam	2hr	40%	15	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي (عملي فقط)	
	Material Covered
Week 1	Introduction to Visual Basic
Week 2	How to program in the Visual Basic language
Week 3	Features of the Visual Basic programming language
Week 4	Design practices of applications and Application programming
Week 5	Coding semantics and applications
Week 6	Introduction to Algorithm and flowcharts
Week 7	Introduction to Visual studio (introduction, symbols, types of flowcharts and exercises)
Week 8	Graphical user interface (toolbox and objects)
Week 9	Constants, variables, arrays, arithmetic operations, procedure and functions.
Week 10	Condition statements (If – Then)
Week 11	Loop statements (For – Next), (Do – While), (Exit loop) and (Stop statements)
Week 12	Debugging and Error Handling
Week 13	Mashed Error control, chart control and common dialog control
Week 14	Create applications for many subjects in the field of our study.
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الملزمة الخاصه بمنهاج تطبيقات الحاسوب (فيجول بيسك)	yes
Recommended Texts		no
Websites		

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

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 (1)**			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	3				
SWL (hr/sem)	90				
Module Level		**UGI**	**Semester of Delivery**		**One**
Administering Department		Fuel and energy Engineering Techniques	**College**	Engineering Technical College- Baghdad	
Module Leader	Hadi Salman Abbas :		**e-mail**	Dr.hadi.salman@sa-uc.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D. Polymer
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .
Indicative Contents المحتويات الإرشادية	Through the prepared curriculum, the student acquires the ability to understand grammar English language through weekly lectures and classes in a gradual and sequential manner for a period of four years, starting from the first stage, such as interrogative, negative, formation of sentences, parts of speech, and others.

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	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	90		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Parts of speech, vocabulary and comprehension
Week 2	Verb to be, present simple, vocabulary and comprehension.
Week 3	Possessive adjective, possessives, verb to have, verb to do, vocabulary and comprehension.
Week 4	Definite Indefinite articles, pronouns, subject, object,
Week 5	This and that, expletive there, prepositions, vocabulary and comprehension
Week 6	Plurals, , expressions of quantity, , vocabulary and comprehension
Week 7	Simple past, modal verbs, auxiliary verbs,
Week 8	Question words, asking questions, vocabulary and comprehension.
Week 9	Negative and interrogative, I would like and I like, vocabulary and comprehension.
Week 10	Writing a composition, punctuation, vocabulary and comprehension.
Week 11	Present continues, vocabulary and comprehension
Week 12	Types of questions, (yes -no) questions and (wh) questions
Week 13	Simple past, vocabulary and comprehension
Week 14	Simple past, **revision**
Week 15	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Headway plus for beginners	Yes
Recommended Texts	Any Grammar and comprehension for technical learning	No
Websites	1- https://www.coursera.org/browse/physical-science-and-engineering/electrical-e ngineering 2- https://link.springer.com/book/10.1007/978-981-10-8624-3 3- https://progressivecollege.ie/courses/early-learning-and-care-qqi-level-5-major-award/?gad=1&gclid=EAIaIQobChMI_Nqu2tqA_wIVZ4VoCR2O0woLEAAYASAAEgI9WvD_BwE	

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 workshops**			**Module Delivery**	
Module Type	B			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	**180**				
Module Level		1	**Semester of Delivery**		**1**
Administering Department		Fuel and Energy Technologies Engineering	**College**	Shatt Al-Arab University College	
Module Leader	Noor Abbass Hinddy		**e-mail**	Noor.Abbass@sa-uc.edu.iq	
Module Leader's Acad. Title		**Engineers**	**Module Leader's Qualification**		**All topics**
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student will be able to: 1. Using measuring tools, Using different kinds of hand tools, Getting a hand intelligent by applying a machining and Industrial operations. 2. Alloying, Contents of alloying workshops, Alloying sands and characteristics and Additives for improvement – Metals melts, Method of casting – Sand mold shaping, and Heat treatment. 3. Tools and machinery in the carpentry workshop, fundamental principles and types of wood and application samples preparation 4. Modes of car motor operation, Fuel feed pump and Electrical spark transfer device. 5. Pistons in cylinder as motion transfer device to the front, back wheels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge the different tools. Employed for surface preparation and methods of application correctly, Devices of measuring dimensions, Calipers, types and uses, Drill types and dimensions 2. Knowledge the measuring tools: Steel miler, Verner, Micrometer, Height & height gauge hand tools, Saws. 3. Knowledge the Hammers, Files, Scriber, Chisels, Taps and dies, Surface plate, Bench working. 4. Know the welding workshop content: Include recognition of tools, materials employed, Gas cylinder of oxy – Acetylene welding of surface – Electrical welding exercise and Welding spot. 5. Knowledge the Lathing Workshop content: lathe machine – Parts – Operation, Practice on longitudinal lathing – Making center – Puncturing, Making external teeth – Practice - Employing measuring tools–internal & external lath machining. 6. Knowledge the contents of alloying workshops. alloying sands and characteristics and Additives for improvement, metals melts, 7. Understanding the method of casting and Sand mold shaping 8. Understanding the Heat treatment. 9. Knowledge the carpentry tools. machinery in the carpentry workshop 10. Understanding the Fundamental principles and Types of wood and Knowledge the application samples preparation 11. Understanding the modes of car motor operation 12. Understanding the Fuel feed pump 13. Understanding the Electrical spark transfer device 14. Understanding the Pistons in cylinder as motion transfer device to the front, back wheels.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Tools: Include recognition of different tools. Employed for surface preparation and methods of application correctly, Devices of measuring dimensions, Calipers, types and uses, Drill types and dimensions. (6 hr). • Measuring Tools: Steel miler, Verner, Micrometer, Height & height gauge hand tools, Saws. Hammers, Files, Scriber, Chisels, Taps and dies, Surface plate, Bench working. (6 hr). • Welding Workshop: Include recognition of tools, materials employed (6hr) • Gas cylinder of oxy – Acetylene welding of surface – Electrical.welding exercise and Welding spot(12hr) • Lathing Workshop: lathe machine – Parts – Operation. (6hr) • Practice on longitudinal lathing – Making center – Puncturing, Making external

	teeth – Practice - Employing measuring tools–internal & external lath machining. (12hr) • Alloying, Contents of alloying workshops, Alloying sands and characteristics and Additives for improvement – Metals melts. (6 hr) • Method of casting, Sand mold shaping, and Heat treatment. (6hr) • Tools and machinery in the carpentry workshop. fundamental principles, Types of wood and application samples preparation(12hr) • Modes of car motor operation, Fuel feed pump and Electrical spark transfer device. (6hr) • Pistons in cylinder as motion transfer device to the front, back wheels.(6hr)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, practical quizzes, reports, seminars, Practical testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	6	10% (10)	2, 5, 8, 11,13,15	
	Assignments	6	10% (10)	2, 5, 8, 11,13,15	
	Projects /	6	10% (10)	Continuous	
	Report	1	10% (10)	14	
Summative assessment	Midterm Exam	1 hr	10% (10)	7	
	Final Exam	1hr	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	

Week 15	

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-2	1. Tools: Include recognition of different tools. Employed for surface preparation and methods of application correctly, 2. Devices of measuring dimensions, Calipers, types and uses, Drill types and dimensions. 3. Measuring Tools: Steel miler, Verner, Micrometer, Height & height gauge hand tools, Saws. Hammers, Files , Scriber , Chisels , Taps and dies , Surface plate , Bench working.
Week 3-5	1. Welding Workshop: Include recognition of tools-Materials employed 2. Gas cylinder of oxy – Acetylene welding of surface – Electrical 3. welding exercise 4. Welding spot.
Week 6-8	1. Lathing Workshop: lathe machine – Parts – Operation 2. Practice on longitudinal lathing – Making center – Puncturing 3. Making external teeth – Practice - Employing measuring tools– 4. Internal & external lath machining.
Week 9-11	Alloying workshop 1. Alloying and contents of alloying workshops 2. Alloying sands, characteristics and Additives for improvement – 3. Metals melts and Method of casting 4. Sand mold shaping, and Heat treatment.
Week 12-13	Carpentry workshop 1. Tools and machinery in the carpentry workshop 2. Fundamental principles and Types of wood 3. Application samples preparation
Week 14-15	Car workshop 1. Modes of car motor operation, 2. Fuel feed pump 3. Electrical spark transfer device. 4. 4. Pistons in cylinder as motion transfer device to the front, back wheels.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Practical training sheets	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Principles of Chemical Engineering**			**Module Delivery**	
Module Type	C			☒**Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code					
ECTS Credits	8				
SWL (hr/sem)	210				
Module Level	1		**Semester of Delivery**	**2**	
Administering Department	Fuel and Energy Technologies Engineering		**College**	Shatt Al-Arab University College	
Module Leader	Maha Munadhil Salmman		**e-mail**	Maha.Munadhil@sa-uc.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	**M.Sc Chemical Engineering**	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mass Balance and Energy Balance	**Semester**	L2-S1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To know the fundamentals of fundamentals units and dimensions. 2. To know the fundamentals for material balances on batch, semi-batch, and continuous processes 3. To the knowledge of the material balances without/ with chemical reactions. 4. To know the real, ideal gases and vapors by studying their properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: 1. Understanding the fundamentals units, dimensions, conversion of units, dimensional homogeneity. 2. To knowledge the process data representation and analysis. 3. To know the chief of process variables, such as mass, volume, flow rate, chemical composition, pressure, and temperature. 4. To the knowledge of the fundamentals for material balances on continuous, batch, and semi-batch processes\ 5. To know the flow charts and flow charts scaling. 6. Understanding the material balances without chemical reactions by choice of basis 7. Understanding the overall and component balances 8. Understanding the balances for systems with recycle and bypass streams. 9. Understanding the material balances with chemical reactions by studying the limiting and excess reactants, conversion, yield, selectivity, and purging. 10. Studying the combustion reactions by understanding the theoretical and excess air 11. To knowledge the material balances on combustion processes. 12. Understanding of the gases and vapors by studying the properties of Ideal gases 13. Understanding the material balances for ideal gas mixtures. 14. Knowledge of real gases and real gas mixtures by studying equations of state, and compressibility charts.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: ● Introduction to Principles of Chemical Engineering, Fundamentals units, and dimensions, process data representation and analysis. (8 hr) ● Process variables, such as mass, volume, flow rate, chemical composition, pressure, and temperature. (8 hr) ● Fundamentals for material balances on continuous, batch, and semi-batch processes, Flow charts and flow charts scaling. (8 hr) ● Material balances without chemical reactions by choice of basis, the overall and component balances. (8 hr) ● Understanding the balances for systems with recycle and bypass streams, material balances with chemical reactions. (4 hr). ● Studying the limiting and excess reactants, conversion, yield, selectivity, and purging. (8 hr) ● Studying the combustion reactions by understanding the theoretical and excess air, the material balances on combustion processes. (4 hr). ● Gases and vapors by studying the properties of Ideal gases, Understanding the material balances for ideal gas mixtures. (4 hr) ● Real gases and real gas mixtures by studying equations of state, and compressibility charts. (4 hr)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, quizzes, seminars, and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	137	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	210		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	5% (5)	3,6, 9,12	
	Assignments	2	5% (5)	6, 12	
	Projects / Lab.	0	0% (0)	-	
	Report	0	0% (0)	-	

Summative assessment	**Midterm Exam**	2 hr	40% (40)	7	
	Final Exam	2hr	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	**Introduction to Engineering Calculations:** Unit, dimensions, conversion of units and dimensional homogeneity, process data representation and analysis.
Week 3-4	**Process Variables:** Mass, volume, flow rate, chemical composition, pressure, and temperature.
Week 5-6	**Fundamentals of Material Balances:** Balances on continues, batch and semi-batch processes, flow charts, flow charts scaling.
Week 7-8	**Material Balances without Chemical Reactions:** Choose of basis, Overall and component balances for systems with recycle and bypass streams.
Week 9-10	**Material Balances with Chemical Reactions** Limiting and excess reactants, conversion, yield, selectivity, purging.
Week 11-12	**Combustion Reactions** Theoretical and excess air, Material balances on combustion processes
Week 13	**Gases and Vapors:** Ideal gases, material balances for ideal gas mixtures
Week 14	**Real gases:** Equations of state, compressibility charts, real gas mixtures.
Week 15	**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	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- David M. Himmelblau, James B. Riggs, 2012, "Basic principles .and calculations in chemical engineering", 8th edition	no
Recommended Texts	- Richard M. Felder, 2019, "Elementary principle of chemical Processes"4th edition.	no
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Mechanics			**Module Delivery**	
Module Type	B			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		Fuel and Energy	**College**	**Engineering Technical College- Baghdad**	
Module Leader	Noor Abbass Hinddy :		**e-mail**	Noor.Abbass@sa-uc.edu.iq	
Module Leader's Acad. Title		Assitant Lecturer	**Module Leader's Qualification**		M.Sc Mechanical Engineering
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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. The course aims to provide first-stage students with basic knowledge of engineering mechanics. 2. Everything related to forces and motion and related concepts such as equilibrium and analysis of forces, centers of gravity, moments of inertia, friction and motion of bodies are studied. 3. The course aims to enable students to gain access to the science of geometry by understanding how to perform correct engineering analysis 4. Dealing with laws, equations, illustrations, and other data, and linking data together to reach outputs. 5. Enabling the student to be able to analyze, devise and draw conclusions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student can understand the fundamentals and laws of engineering mechanics. 2. The student is familiar with the types of forces and methods of analysis. 3. The student can understand the basics of the Equilibrium of a Particle 4. Understand the Moment of a Force around the point and axis. 5. Learn the basics of Equilibrium of a Rigid Body and equations of equilibrium. 6. The student can understand Structural Analysis. 7. Enabling students to obtain knowledge, understanding, and analyze the motion of mechanical systems. 8. Learn concepts of motion laws. 9. Learn and analyze the motion of projectiles. 10. Absolute Dependent Motion Analysis of Two Particles. 11. The Students can understand the Kinetics of a Particle: Force and Acceleration. 12. The Students can understand the Kinetics of a Particle: Work and Energy.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** 1. The fundamentals and laws of engineering mechanics. 2. Analyze forces. 3. Equilibrium of a Particle 4. the Moment of a Force 5. Structural Analysis

	6. Laws of Motion. 7. Analyze the motion of mechanical systems.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exams, Quizzes, reports, Practical testing ,and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	8 , 15	
	Assignments	5	10% (10)	3,5,7,10,13	
	Projects / Lab.				
	Report	2	10% (10)	8 , 15	
Summative assessment	**Midterm Exam**	2 hr	20% (20)		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	STATIC : Basic principles in mechanics, Vector Quantities and forces Analysis (2d ,3d)
Week 2	Equilibrium of a Particle (2d , 3d)
Week 3	Force System Resultants: Moment of a Force Scalar Formulation/Moment of a Force-Vector Formulation
Week 4	Force System Resultants: Moment of a Force about a Specified Axis/Moment of a Couple
Week 5	Equilibrium of a Rigid Body: Conditions for Rigid Body Equilibrium/ Free-Body Diagrams/ Equations of Equilibrium
Week 6	Equilibrium in three dimensions: Free-Body Diagrams/ Equations of Equilibrium
Week 7	Structural Analysis: Simple Trusses/ The Method of Joints/ Zero·Force Members
Week 8	Structural Analysis:The Method of Sections/ Space Trusses/ Frames and Machines
Week 9	DYNAMICS: Kinematics of a Particle/ Rectilinear Kinematics: Continuous Motion
Week 10	Motion of a Projectile
Week 11	Absolute Dependent Motion Analysis of Two Particles
Week 12	Kinetics of a Particle: Force and Acceleration
Week 13	Kinetics of a Particle: Work and Energy/ The Work of a Force
Week 14	Principle of Work and Energy
Week 15	Power and Efficiency

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	ENGINEERIN MECHANICHS / R. C. HIBBELER/ TWELFTH EDITION	YES
Recommended Texts	J.L. MERIAM, L.G. KRAIGE and J. N . BOLTON, ENGINEERING MECHANICS STATICS, EIGHTH EDITION	
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 (2)			**Module Delivery**	
Module Type	B			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level	UGI		**Semester of Delivery**	Two	
Administering Department	Fuel and Energy Technologies Engineering		**College**	Shatt Al-Arab University College	
Module Leader	Zahraa Ahmmad Nadeem		**e-mail**	Zahraa.Ahmmad@sa-uc.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**	M.Sc Thermal Engineer	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics 1	**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. To develop problem solving skills and understanding differentiation and integration 2. To understand rule of derivatives, composition of functions and chain rule. 3. This course deals with the differentiation and integration. 4. Understand and study applications of differentiation and integration. 5. To understand methods of integration.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the course, students are able to: 1. Describe elementary special functions (e.g., exponential, log, and trigonometric functions) which arise in engineering. 2. Practice the skills obtained from differential and integral calculus to deal with models in engineering.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Derivative for types of functions [36hr] 2. Integral and methods of integration [48hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to courage 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	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5,10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2,12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	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	Differentiation: Rules of derivatives.
Week 2	Composition of functions, chain rule, and higher derivative.
Week 3	Application of derivatives L-Hospital's Rule: Indeterminate quantity
Week 4	Derivative of non-algebraic function: differentiation of trigonometric functions and Invers trigonometric functions.
Week 5	Derivative of logarithm functions and Invers logarithm functions.
Week 6	Derivative of Exponential functions, Derivative of hyperbolic functions and invers hyperbolic functions.
Week 7	Integrals: rules of integrals, integrals of exponential functions, integral of inverse trigonometric function.
Week 8	Integral of hyperbolic function, special cases ($tanx, cotx, secx, and\ cscx$) of even power.
Week 9	Integration methods: 1st method integration by parts.
Week 10	Integration methods: 2nd products and powers of trigonometric function.
Week 11	Integration methods: 3rd Trigonometric substitutions.
Week 12	Integration methods: 4th integral involving $ax^2 + bx + c.$, and Integration methods: 5th

	partial fractional.
Week 13	Integration methods: 6^{th} rational functions of $sinx$ & $cosx$.
Week 14	Applications of integrals.
Week 15	Final exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	G. Stephenson, " Mathematical methods for science students " Longman Hausa , 1981	no
Recommended Texts	G. Thomas and R. Finney " calculus and analytic geometry " sixth edition, 2008.	yes
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**حقوق الانسان والديمقراطية**			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	2.00				
SWL (hr/sem)	60				
Module Level	2		**Semester of Delivery**	Two	
Administering Department	Fuel and Energy Technologies Engineering		**College**	Shatt Al-Arab University College	
Module Leader	Ali Ahmmad AbdulAmmer		**e-mail**	Ali.Ahmmad@sa-uc.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc	
Module Tutor	None		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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-زيادة معرفة الطالب بالجانب المفاهيمي النظري والتطور التاريخي لمادة حقوق الانسان والديمقراطية 2- تنمية مهارات الطالب التحليلية والنقدية فيما يتعلق بواقع ومستقبل حقوق الانسان والديمقراطية 3- تدريب الطالب على اهمية المشاركة الفاعلة في جوانب الحياة العامة كتعزيز احترام مبادى حقوق الانسان العامة والمشاركة الفاعلة في الحياة السياسية والثقافية. 4- تمكين الطلاب من فهم اهمية التعليم ودوره في نشر ثقافة حقوق الإنسان والديمقرلطية في بناء مجتمع حضاري يقوم على أساس الحكم الصالح الذي من اهم مقوماته الإيمان بحقوق الإنسان والتربية عليها والمشاركة الفاعلة في الحكم عبر الانتخابات الحرة والعادلة
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- يفهم معنى حقوق الانسان وأشكالها 2- يعرف المواثيق والعهود الدولية لحقوق الانسان 3- يعرف مفهوم الحريات وتصنيفها 4- اهم مبادئ وتطبيقات نظم الديمقراطية
Indicative Contents المحتويات الإرشادية	1- التعامل مع الانتهاكات الحاصلة لحقوق الانسان 2- يفهم حقوقه وواجباته اتجاه المجتمع 3- فهم ممارسة التطبيقات الديمقراطية

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	المشاركة اليومية- اختبارات يومية- اختبارات فصلية- الاختبارات النهائية- الحضور اليومي -تقديم تقارير كنشاط فصلي

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	15	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	60		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	%20 (20)	4,11	
	Assignments				
	Projects / Lab.				
	Report	1	%10 (10)		
Summative assessment	Midterm Exam	2 hr	%20	7	
	Final Exam	2hr	%50	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	حقوق إنسان، تعريفها، أهدافها. حقوق الإلانسان في الشرائع السماوية مع التركيز على حقوق الانسان في الاسلام
Week 2	حقوق الانسان في التاريخ المعاصر الحديث المنظمات غير الحكومية العاملة بحقوق الانسان
Week 3	حقوق الانسان في الدساتير العراقية
Week 4	العلاقة بين حقوق الانسان والحريات العامة حقوق الانسان الاقتصادية والاجتماعية والسياسية
Week 5	حقوق الانسان الحديثة ضمانات احترام وحماية حقوق الانسان على الصعيد الوطني
Week 6	دور المنظمات الاقليمية العاملة بحقوق الانسان النظرية العامة للحريات
Week 7	القاعدة الشرعية لدولة القانون تنظيم الحريات من قبل السلطة العامة

Week 8	الديمقراطية وتعريفها وانواعها مفاهيم الديمقراطية
Week 9	الديمقراطية في العالم الثالث ألانظمة الديميقراطية في العالم الثالث
Week 10	مفهوم الحريات و تصنيف الحريات العامة الحريات ألاساسية، الحريات الفكرية والاقتصادية والاجتماعية
Week 11	حرية االامن والشعور باالاطمئنان وحرية الذهاب واالياب حرية التعليم والصحافة والتجمع
Week 12	حرية الجمعيات والعمل حرية التملك
Week 13	حرية التجارة والصناعة حرية المرأة
Week 14	الحريات السياسية والحريات العامة
Week 15	التقدم العلمي والتقين والحريات العامة مستقبل الحريات العامة
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	None
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	هادي, رياض عزبز. (2005). حقوق الانسان (تطورها ـ مضامينها ـ حمايتها) (بغداد.) الدليمي, حافظ علوان. (2009). قراءة معاصرة لموضوعة حقوق الانسان.	لا
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Organic chemistry			**Module Delivery**	
Module Type	**C**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code					
ECTS Credits	**7**				
SWL (hr/sem)	**210**				
Module Level	1		**Semester of Delivery**	TWO	
Administering Department	Fuel and Energy Technologies Engineering		**College**	Shatt Al-Arab University College	
Module Leader	Murtada Firass Hassan		**e-mail**	Murtada.Firass@sa-uc.edu.iq	
Module Leader's Acad. Title	Assitance Lectrur		**Module Leader's Qualification**	M.Sc Chemistry	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand the basics of organic chemistry, which includes classifications, functions, reactions, equations, chemical calculations, isomers, derivatives, shapes and structures of each type. 2. To explain the difference between alkane ,alkene and alkyne . 3. To know the main organic materials used in the fields of chemical industries. 4. 4-Clarification and explanation of the concept of hydrocarbons and their uses in the fields of industry 5. Understand the meaning of carboxylic acids and methods of preparation
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: 1. Understanding of the fundamentals of organic compounds. 2. Recognize the features of the Practical organic chemistry physical properties of liquid and solid organic compounds. 3. List the application of organic compounds. 4. Understanding of Hydrocarbon: alkanes, formulation-Hydrocarbons-saturated. 5. Summarize what is mean of Alcohols. 6- Discuss the various properties between Aldehydes and ketones. 7- understanding of Cyclic compounds structure . 8- To know the Amides reaction . 9- To know the Amines, derivatives of amine, diazoniem sats. 10- To know the Ethers structure,classiffaction and reaction
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to organic compounds 2. Aromatic compounds and types of it. 3. Classification of Hydrocarbon compounds 4. Reactions of Alkane ,alkene and alkyne 5. Methods of preparation of amides 6. Introduction to Amines, derivatives of amine, diazoniem sats. 7. Classification Alcohols. 8. Reactions of Ethers 9. Methods of preparation of Cyclic compounds

	10. Preparation Alkene.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	116	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	94	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	210		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Organic chemistry, bonds, dipolar couple type of hybridization, orbitals.,
Week 2	Practical organic chemistry physical properties of liquid and solid organic compounds.
Week 3	Hydrocarbon: alkanes, formulation-Hydrocarbons-saturated.
Week 4	Alkene
Week 5	Alkyne
Week 6	Cyclic compounds.
Week 7	Aromatic hydrocarbon

Week 8	Alcohol
Week 9	Phenols.
Week 10	Aldehydes and ketones
Week 11	Ethers
Week 12	Esters.
Week 13	Amines, derivatives of amine, diazoniem sats.
Week 14	Amides.
Week 15	Carboxylic acids.
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Safety in laboratory, laboratory tool , How to write a scientific report
Week 2	Measurement of the density by pycnometer and hydrometer
Week 3	Extraction of heavy oils from water
Week 4	Distillation an organic compound)alcohol(from water
Week 5	Measure the melting point of an organic compounds
Week 6	Recrystallization.
Week 7	TITRATION

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Organic Chemistry Paperback – January 1, 2010 by SAIBAL KANTI BHATTACHARJEE ROBERT THORNTON MORRISON , ROBERT NEILSON BOYD (Author)	yes
Recommended Texts	PRINCIPLES OF GENERAL, ORGANIC, & BIOLOGICAL CHEMISTRY , Published by McGraw-Hill, a business unit of The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY 10020. Copyright © 2012 by The McGraw-Hill Companies, Inc	no
Websites	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Book%3A_Organic_Chemistry_Nomenclature_Workbook_(O'Donnell)	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	اللغة العربية			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	2				
SWL (hr/sem)	60				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		قسم هندسة تقنيات الوقود و الطاقة	**College**	كلية شط العرب الجامعة	
Module Leader	عبدالحسين برغش		**e-mail**		
Module Leader's Acad. Title		مدرس	**Module Leader's Qualification**		دكتوراه في اللغة العربية
Module Tutor	لا يوجد		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• 1- تعميق معرفة الطالب بقواعد اللغة والإملاء التي تعلمها سابقا؛ ليتحاشى الوقوع في الأخطاء اللغويّة والاملائية، وليسهل عليه كتابة التقارير وجميع الأعمال الكتابية بصورة صحيحة نحويًا ولغويًا. • 2- توسيع نطاق الوعي اللغويّ والأدبيّ ليشمل جميع الطلبة والمجتمع المحلي من خلال المحاضرات والندوات والدورات التدريبية المختلفة، والأخذ بيد المبدعين مِن أصحاب المواهب.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	المعرفة والفهم والتطبيق من خلال إلقاء المحاضرات النظرية الصفية وحث الطلبة على قراءة كتاب معين في المادة، إضافة إلى تكليف الطلبة بواجبات بحثيّة، أو تقارير مكتبيّة وذلك في مستوى السنة الأولى من الدراسة.
Indicative Contents المحتويات الإرشادية	يتكون المقرر من جزء واحد يتناول تعليم الطلبة القواعد العامة للكتابة باللغة العربية بما يضمن عدم الإخلال بأساسيات هذه اللغة.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	استراتيجيات التعلم: التعلم الذاتي ـ التعلم النشط ـ التعلم التعاوني. استراتيجيات التعليم : عرض المادة ـ طرح الأسئلة ـ اختبارات صفيّة ـ واجب بيتي.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	15	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	60		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20%	1 ,2 ,3 , 4	تطبيق ما تعلمه الطالب من قواعد في الأعمال الكتابية وتنمية المعرفة اللغويّة لديه من خلال تمكين مهارات الإملاء، واستخدام الكلمة المناسبة في موضعها المناسب.
	Assignments	2	10%	5 , 11	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20%	7	
	Final Exam	3hr	50%	15	
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	- مفهوم الأخطاء اللغويّة - قواعد كتابة التاء المربوطة والتاء المفتوحة

Week 2	- الألف الممدودة والمقصورة - الحروف الشمسيّة والقمريّة
Week 3	الضاد والظاء
Week 4	كتابة الهمزة: - همزة الوصل والقطع - الهمزة المتوسطة - الهمزة المتطرفة
Week 5	علامات الترقيم
Week 6	الاسم والفعل والتفريق بينهما
Week 7	المفاعيل: - المفعول به - المفعول المطلق - المفعول لأجله - المفعول فيه - المفعول معه
Week 8	العدد
Week 9	تطبيقات الأخطاء اللغويّة الشائعة
Week 10	تطبيقات الأخطاء اللغويّة الشائعة
Week 11	- معاني حروف الجر - قاعدة الألف الفارقة - قاعدة النون والتنوين
Week 12	الجوانب الشكلية للخطاب الإداري
Week 13	لغة الخطاب الإداري
Week 14	لغة الخطاب الإداري
Week 15	امتحان

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	1. كتاب الاملاء الفريد: نعوم جرجيس زرازير، نقحه: د. مصطفى جواد – مطابع النعمان النجف الاشرف – ط6- 1973م. 2. كتاب الاملاء للمرحلة المتوسطة: عبد الجبار عبد الله الآلوسي واخرون – وزارة التربية المديرية العامة للمناهج – ط18 – 2014م. 3. دروس فب اللغة والنحو والاملاء لموظفي الدولة: إسماعيل حمود عطوان واخرون – مطبعة وزارة التربية (3) بغداد – ط2 – 1984م. 4. اللغة العربية العامة لأقسام غير الاختصاص: عبد القادر حسن امين واخرون – وزارة التعليم العالي والبحث العلمي – ط2 – 2000م.	نعم
Recommended Texts		
Websites		

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

قسم هندسة تقنيات الوقود والطاقة

المرحلة الثانية

مسار بولونيا

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mass and Energy Balances**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	7				
SWL (hr/sem)	210				
Module Level		**UGII**	**Semester of Delivery**		**Three**
Administering Department		Fuel and Energy Technologies Engineering	**College**	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name		no	**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Understanding the fundamentals of conservation of both Mass and Energy are fundamentals on which all Chemical Processing is based. Being able to properly formulate and solve material and energy balances and in so doing integrate and interpret physical property data from different sources and in a variety of different units is an essential skills for an engineer. 2- To know the fundamental concept used when analysing the mass and energy flows in chemical processing 3- To knowledge the solve material and energy balances on chemical process systems(batch, semibatch, continuous, transient and steady state processes) and lays the foundation for subsequent in thermodynamics, unit operations and transport phenomena, sketch a flowchart and labels it. 4- To know solving process-related problems: breaking a process down into its components, establishing the relations between known and unknown process variables, assembling the information needed to solve for the unknowns using a combination of experimentation, empiricism, and the application of natural laws, and, finally, putting the pieces together to obtain the desired problem solution.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students are expected to be able to demonstrate understanding of: Principles of mass and energy balances; • apply material balances on nonreactive single-unit processes and apply material balances on reactive multiple unit processes • explain the meaning of batch, semibatch, continuous, transient and steady state processes. • sketch a flowchart and labels it. • identify a convenient basis of calculation. • calculate the degrees of freedom. • explain the meaning of purge, recycle and bypass. • identify the sub systems for which balances might be written. • calculate the unknown variables by solving material balances. • list and define the three components of the total energy of a process system and the two forms of energy transfer between a system and its surroundings by stating the conditions under which heat and work are

	positive. • define the terms closed system, open system, isothermal process and adiabatic process. • solve the energy balance for a given closed system. • define the terms flow work, shaft work, specific internal energy, specific volume and specific enthalpy. • derive the steady state mechanical energy balance equation for an open system. • use Hess law. • solve combustion problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Topics covered include material balances around single process units and groups of units, involving simple systems and recycle streams, and non-reacting and reacting systems.(12 hr) Total, component, and elemental balances are covered. Other topics include systems of units and unit conversion, and compositions of mixtures.(10hr) Energy balances: The concepts of energy, work and heat, the units of energy, internal energy, enthalpy, heat capacity, latent heat, evaluation of enthalpy changes. The general energy balance equation, enthalpy balances, system boundaries. Enthalpies of pure components and selection of enthalpy data conditions.(12 hr) Energy balances and chemical reactions: Heat of reaction, definitions of standard heat of reaction, standard heat of formation, standard heat of combustion. Hess' Law of adding stoichiometric equations. Adiabatic reaction temperature. Heats of solutions and dilution, and use of enthalpy-concentration charts. Simultaneous material and energy balances.(13 hr)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, and Online testing.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	136	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	210		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Revision to Material Balances.
Week 2	Material and energy balances on steady state processes. identify a convenient basis of calculation. calculate the degrees of freedom.
Week 3	

	Multiple unit system involving reaction
Week 4	recycle, and purge
Week 5	Differential balance, integral balance, unsteady state material balances on non-reactive systems,
Week 6	Flow sheets,
Week 7	Balances for batch and continuous plants.
Week 8	Elements of energy balances.
Week 9	-Change in pressure at constant temperature, sensible heat, heat capacities.
Week 10	Energy balance on single-phase systems, energy balance on phase change systems.
Week 11	Energy balance on phase change systems.
Week 12	Heats of solution and mixing, latent heat of vaporization,
Week 13	Enthalpy calculation. Concentration charts, Partial saturation and humidity, Psychometric charts
Week 14	Heats of reaction, Heats of formation, heat of combustion, adiabatic systems.
Week 15	unsteady state energy balances on reactive systems

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- **Richard M. Felder and Ronald W. Rousseau,"ELEMENTARY PRINCIPLESOF CHEMICALPROCESSES", Third Edition John Wiley & Sons, Inc., 2005 Edition,with Integrated Media and Study Tools.** **2--Mass and Energy Balancing Calculations for Plant Design, David Pritchard and Shaik Feroz, © 2021 Taylor & Francis Group, LLC**	no
Recommended Texts	1-**SUPPLEMENTARY PROBLEMS FOR BASIC PRINCIPLES AND CALCULATIONS INCHEMICAL ENGINEERING 6TH EDITION, David M. Himmeblau,The University of Texas,©1996 by David M. Himmelblau.** **2.- ,David M. Himmelblau James B. Riggs, SOLUTIONS MANUAL,Basic Principles and Calculations in Chemical Engineering,Eighth Edition, Copyright © 2012 Pearson Education, Inc.**	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	**Thermodynamics-1**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**6**				
SWL (hr/sem)	**180**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Fuel and Energy Technologies Engineering	**College**	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To familiarize the students with basic concepts of the first and second laws of thermodynamics and their applications in engineering problems. 2. To Develop a practical ability to solve energy balance problems , minimum work. 3. To Students will demonstrate basic understanding of basics and definitions of thermodynamics and properties of pure substances. 4. To Describe the reversible and irreversible processes (macroscopic description of an ideal and real processes)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to familiarize the students with basic concepts of the first and second laws of thermodynamics and their applications in engineering problems. 2. Ability to Develop a practical ability to solve energy balance problems , minimum work. 3. Ability to Students will demonstrate basic understanding of basics and definitions of thermodynamics and properties of pure substances. 4. Ability to Describe the reversible and irreversible processes (macroscopic description of an ideal and real processes)
Indicative Contents المحتويات الإرشادية	**Basic Concepts** The terminologies of thermodynamics, the variables and quantities of thermodynamics, categorization of systems and processes. [12 hrs.] **First law of Thermodynamics** The first law and internal energy, statements of first law for the non-flow and flow systems, enthalpy and heat capacity limitations of the first law. [10 hrs.] **Second Law Thermodynamics** Statements of the second law of thermodynamics, available and unavailable energies, and the entropy function, applications of the second law. [10 hrs.] **Thermodynamic Formulations** Measurable quantities, basic energy relations, maxwell relations, thermodynamic formulations to calculate enthalpy, [15 hrs.] **Thermodynamic Properties of Real Gases** The pvt behavior of fluids, laws of corresponding states and equation [12 hrs.] **Course Schedule Week Topic** states approaches to the pvt relationships of non-ideal gas problems, compressibility factors, generalized equations of state [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 are 1. Teamwork 2. Visualization 3. Inquiry-Based Teaching 4. Student-led Classroom 5. Implementing Technology in the Classroom 6. Auditory strategies 7. Reading & Writing

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic Concepts The terminologies of thermodynamics the variables and quantities of thermodynamics
Week 2	Categorization of systems and processes Energy classifications
Week 3	Point and path properties, energy in transition
Week 4	Heat and work reversible and irreversible processes, phase rule.
Week 5	First law of Thermodynamics. The first law and internal energy statements of first law for the non-flow and flow systems,
Week 6	Enthalpy and heat capacity limitations of the first law.
Week 7	Second Law Thermodynamics Statements of the second law of thermodynamics available and unavailable energies
Week 8	The entropy function applications of the second law.
Week 9	Thermodynamic Formulations Measurable quantities, basic energy relations Maxwell relations
Week 10	thermodynamic formulations to calculate enthalpy internal energy and entropy as function of pressure and temperature,
Week 11	other formulations involving cp and cv complex thermodynamic formulations
Week 12	Thermodynamic properties of an ideal gas Entropy change in reversible and irreversible process.
Week 13	Thermodynamic Properties of Real Gases The pvt behavior of fluids laws of corresponding states and equation
Week 14	Course Schedule Week Topic states approaches to the pvt relationships of non-ideal gas problems compressibility factors,
Week 15	generalized equations of state property estimation via generalized equation of state
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	[1] Abbott, Michael M., Joseph M. Smith, and Hendrick C. Van Ness. "Introduction to chemical engineering thermodynamics." McGraw-Hill. [2] Elliott, J. Richard, and Carl T. Lira. "Introductory chemical engineering thermodynamics". Upper Saddle River, NJ: Prentice Hall PTR. [3] Narayanan, K. V.A chemical engineering thermodynamics. PHI Learning Pvt. Ltd..	yse
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physical chemistry**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**6**				
SWL (hr/sem)	**102**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		
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.Develops understanding of mass, energy, heat, work, efficiency, ideal and real 2. Understanding the thermodynamic cycles and processes. 3. To know the Covers first and second laws of thermodynamics 4. To know the perfect gas law, properties of real gases, 5. Understanding the general energy equation for closed and open systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: 1. Understand the thermodynamic cycles and processes. 2. To know the main equation for closed and open systems. 3. Understand the meaning thermodynamics, perfect gas law. 4. Understand the properties of real gases, and the general energy. 5. Enable students to obtain knowledge and understanding of the principles of gas laws 6. Enabling students to obtain knowledge and understanding of the laws of thermodynamics 7. Enabling students to obtain knowledge and understanding of the 8. relationship between laws 9. Enabling students to acquire knowledge of the methods of deriving the basic 10- Enable students to identify the most important applications of Thermodynamics
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 6. Introduction to thermodynamic. 7. Main equation for closed and open systems. 8. identify the most important applications of 9. acquire knowledge of the methods of deriving the basic equations of thermodynamics, Ideal and real gases 10. Introduction to gas law.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	10% (10)		
	Assignments	2	10% (10)		
	Projects	1	10% (10)		
	Report/ Lab.	10	10% (10)		
Summative assessment	**Midterm Exam**		10% (10)		
	Final Exam	4 hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	History and Development of Refining Processes, Kinds of Refineries, Refinery feed stocks and products
Week 2	Classification and Evaluation of crude petroleum and its derivatives
Week 3	Processing of Petroleum Liquids: Stabilization dehydration, tube still heaters , Atmospheric and Vacuum Fractionation towers.
Week 4	Material and Energy Balances, Refluxes, Temperature Distribution in Fractionation Tower.
Week 5	Upgrading the Distillates: Alkylation and Isomeric transformation, Catalytic polymerization, Thermal cracking processes, Catalytic polymerization
Week 6	Processing of Petroleum, Processing of Petroleum Liquids: Stabilization dehydration, tube still heaters. Atmospheric and Vacuum Fractionation towers. Material and Energy Balances, Refluxes, Temperature Distribution in Fractionation Tower.
Week 7	Treating Process
Week 8	Vapor Pressure, Octane Number, Viscosity, Flash Point, Aniline Point and Pour Point.
Week 9	Petroleum distillates additives: Anti knocking, Anti-oxidant, Anti-corrosion, Anti-vaporization, Combustion inhibitors, Anti foaming
Week 10	Dewaxing. Coking and treatment of bottom of the barrel, Residue upgrading
Week 11	Vapor Pressure, Octane Number, Viscosity, Flash Point, Aniline Point and Pour Point.
Week 12	
Week 13	Distillation Curves ,Mid present, flash-vaporization, and yield curves
Week 14	Lubricants oil processing: propane deasphalting ,Solvent extraction
Week 15	Refinery economics
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Safety in laboratory, laboratory tool , How to write a scientific report
Week 2,3	Measurement of the density by pycnometer and hydrometer
Week 4,5	Extraction of heavy oils from water
Week 6,7	measurement Surface tension
Week 8.	measurement refractive index
Week 9	Viscosity measurement
Week 10.11	Find the calorimeter constant
Week 11,12	the molecular weight of a volatile liquid using the Dumas method
Week 13	solubility
Week14	Preparatory week before the final Exam
Week15	final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Physical chemistry/ 4th edition/ Houghton Mifflin Co. / N.Y. / 2003	yes
Recommended Texts	Physical Chemistry/ P.W.Atkins/ 9th edition / Oxford university press/ 2009	no
Websites	https://chem.libretexts.org/Special:FirstLoginWelcome?return=	

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 (3)**			**Module Delivery**	
Module Type				☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	Three	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics (2)	**Semester**	Two
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: 6. To develop problem solving skills and understanding differentiation and integration 7. To understand Vectors and Vector Function. 8. This course deals with the Complex numbers ,Function with two or more variables, Double integration, Polar coordinates. 9. This is the basic subject for Linear integration, Series and Matrix. 10. To understand First order differential equations and simple higher order differential equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning differentiation and integration equation. 2. Solution the straight and plane in space equation. 3. Solution Partial differentiation. 4. Summarize Double integration. 5. Solution and draw Curves sketching in polar coordinates. 6. Learning Green's theory -Divergence theory. 7. Solution Linear integration. 8. Solution Series and matrix. 9. Learning First order differential equations and simple higher order differential equations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 3. Part A – Vectors General introduction on vectors in spaces -straight and plane in space equation - plane -tangent -perpendicular line - Vector Function. 4. Part B - Complex numbers polar formula - Euler equation - powers and roots of complex numbers - complex functions- Cauchy- Reman equation. 5. Part C - Function with two or more variables Partial differentiation - Partial differentiation chain rule -Victor and valued differentiation - Maximum and minimum values for two variable functions. Double integration - Areas and volumes -Physical applications- Triple integrals. 6. Part D - Polar coordinates Cylindrical and spherical coordinates - Curves sketching in polar coordinates.

	Green's theory -Divergence theory. 7. Part E – Series Number sequences — Definition-Limits —Infinite series - Limits definition - Alternating series tests. Power series - Convergence period - Taylor and Macbrain function series - General applications. 8. Part F – Matrix matrix methods – Internal values and vectors.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to courage 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	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
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5,10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2,12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	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	General review on differentiation and integration
Week 2	Vectors: General introduction on vectors in spaces -straight and plane in space equation - plane -tangent -perpendicular line - Vector Function.
Week 3	Complex numbers - polar formula - Euler equation - powers and roots of complex numbers - complex functions- Cauchy- Reman equation
Week 4	Function with two or more variables- Partial differentiation - Partial differentiation chain rule -Victor and valued differentiation - Maximum and minimum values for two variable functions.
Week 5	Double integration - Areas and volumes -Physical applications- Triple integrals.
Week 6	Polar coordinates - Cylindrical and spherical coordinates - Curves sketching in polar coordinates.
Week 7	Green's theory -Divergence theory.
Week 8	Linear integration
Week 9	Series :Number sequences — Definition-Limits —Infinite series - Limits definition - Alternating series tests.
Week 10	Power series - Convergence period - Taylor and Macbrain function series - General

	applications.
Week 11	Convergence period - Taylor and Macbrain function series - General applications.
Week 12	Matrix: matrix operations -Matrix inversion - Linear systems equations
Week 13	Solving linear systems by matrix methods – Internal values and vectors.
Week 14	First order differential equations and simple higher order differential equations.
Week 15	Final exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	G. Stephenson, " Mathematical methods for science students " longman hause , 1981	no
Recommended Texts	G. Thomas and R. Finney " calculus and analytic geometry " sixth edition, 2008 .	yes
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Applications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**4**				
SWL (hr/sem)	**59**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Application (1)	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	MATLAB is one of the languages used by engineers and scientists to create programs for engineering and scientific calculations. MATLAB allows large amounts of data to be analyzed very efficiently. It is explained how to benefit from the MATLAB language so that the student has the ability to deal comfortably with programming using the language. The curriculum contains: dealing with variables, dealing with matrices operations, making functions, making graphs building interactive programs, and dealing with different toolboxes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the module, students will be able to • Analyze data • Develop algorithms • Create models and applications • Calculate part features using math skills
Indicative Contents المحتويات الإرشادية	The following is a list of topics that will be covered during this module: ✓ Use and apply Basic Mathematical Operations. ✓ Creating Basic equations ✓ Controlling the Hierarchy of Operations or Precedence ✓ Creating Simple Plots ✓ Defining and entering vectors and matrices elements: ✓ Solving linear and complex equations ✓ Using Graphical User Interface in MATLAB

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to courage 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	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20%	2, 5, 9, 12	
	Assignments				
	Projects / Lab.	1	20%	13	
	Report				
Summative assessment	**Midterm Exam**	1hr	10%	7	
	Final Exam	3hr	50%	15	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي (عملي فقط)	
	Material Covered
Week 1	Introduction to MATLAB
Week 2	Introduction to Mathematical Functions
Week 3	Applications of mathematical functions
Week 4	Introduction to vectors and matrices
Week 5	Applications of vector and matrices
Week 6	Introduction to Programming in MATLAB
Week 7	Introduction to Control Flow and Operators
Week 8	if statement, the for loop, the while loop, and the switch statement with its applications
Week 9	Debugging M-Files
Week 10	Introduction to Mathematical Equations in MATLAB
Week 11	Application of Mathematical Equations in MATLAB
Week 12	Graph Plot in MATLAB
Week 13	Graphical User Interface in MATLAB
Week 14	Image Processing in MATLAB
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الملزمة الخاصه بمنهاج تطبيقات الحاسوب (ماتلاب) في الكلية التقنية الهندسية بغداد	yes

Recommended Texts		no
Websites	https://ch.mathworks.com/?s_tid=gn_logo	

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 (2)**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**2**				
SWL (hr/sem)	**60**				
Module Level		UGII	**Semester of Delivery**		**3**
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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 goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .
Indicative Contents المحتويات الإرشادية	Through the prepared syllabus, the student acquires the ability to understand grammar English language through weekly lectures and classes in a gradual and sequential manner for a period of four years, starting from the first stage, such as interrogative, negative, formation of sentences, parts of speech, and others.

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	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	15	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	60

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

	Material Covered
Week 1	Revision, vocabulary and comprehension
Week 2	Present continuous, comparative and superlative adjective, vocabulary.
Week 3	Time clauses, this and that, vocabulary and comprehension.
Week 4	If clauses, vocabulary and comprehension
Week 5	This and that, expletive there, prepositions
Week 6	Past perfect, past perfect continuous , vocabulary and comprehension
Week 7	Relative pronouns, relative clauses
Week 8	Past perfect, Past perfect continuous, vocabulary and comprehension
Week 9	Used to, Infinitives, passive voice
Week 10	Passive voice, coordinating conjunctions, subordinating conjunction
Week 11	Future perfect, future perfect continuous, vocabulary and comprehension
Week 12	Writing a composition, comprehension
Week 13	Technical English (1), Keywords, English use
Week 14	**Revision**
Week 15	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Headway plus for pre intermediate	Yes
Recommended Texts	Any Grammar and comprehension for technical learning	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	**Thermodynamics-2**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**6**				
SWL (hr/sem)	**180**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	5. To discuss the study of Power cycles; Refrigeration and liquefaction process 6. To analyze Theory and application of solution thermodynamics ;Vapor/liquid equilibrium in both 7. To explain binary and multicomponents; Ideal and non-ideal solutions are discussed using Raoult's and modified 8. To explain Raoult's law; Fugacity and fugacity coefficient definitions; Chemical reaction equilibriumand 9. To explain Thermodynamic analysis of processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to discuss the study of Power cycles; Refrigeration and liquefaction process 2. Ability to analyze Theory and application of solution thermodynamics ;Vapor/liquid equilibrium in both 3. Ability to explain binary and multicomponents; Ideal and non-ideal solutions are discussed using Raoult's and modified 4. Ability to explain Raoult's law; Fugacity and fugacity coefficient definitions; Chemical reaction equilibriumand 5. Ability to To explain Thermodynamic analysis of processes.
Indicative Contents المحتويات الإرشادية	**Properties of Solutions** Partial molar properties, ideal and non-ideal solutions, standard states definition and choice, gibbs-duhem equation [12 hrs.] **Phase Equilibria** Criteria for equilibrium between phases in multi component non-reacting systems in terms of chemical potential and fugacity [10 hrs.] **Correlation of Phase Equilibria** Activity coefficient-composition models, thermodynamic consistency of phase equilibria [10 hrs.] **Chemical Reaction Equilibria** The reaction coordinate, standard Gibbs-energy change, equilibrium constant, effect of temperature on equilibrium constant [12 hrs.] **Cycle** Carnot refrigeration cycle; air refrigeration cycle; vapor compression cycles; comparison of refrigeration cycles absorption refrigeration, [8 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 are 8. Teamwork 9. Visualization 10. Inquiry-Based Teaching 11. Student-led Classroom 12. Implementing Technology in the Classroom 13. Auditory strategies 14. Reading & Writing

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	fugacity and fugacity coefficients of real gases standard states definition and choice,
Week 2	Properties of Solutions Partial molar properties ideal and non-ideal solutions
Week 3	gibbs-duhem equation excess properties of mixtures
Week 4	Phase Equilibria Criteria for equilibrium between phases in multi component non-reacting systems in terms of chemical potential and fugacity
Week 5	application of phase rule vapor-liquid equilibrium,
Week 6	phase diagrams for homogeneous systems and for systems with a miscibility gap effect of temperature and pressure on azeotrope composition
Week 7	liquid-liquid equilibrium ternary liquid-liquid equilibrium.
Week 8	Correlation of Phase Equilibria Activity coefficient-composition models, thermodynamic consistency of phase equilibria, application of the correlation and prediction of phase equilibria in systems of engineering
Week 9	interest particularly to distillation and liquid extraction processes.
Week 10	Chemical Reaction Equilibria The reaction coordinate standard Gibbs-energy change
Week 11	equilibrium constant effect of temperature on equilibrium constant,
Week 12	relation of equilibrium constants to composition(gas phase reaction and liquid phase), equilibrium conversion, multireaction equilibria
Week 13	Cycle Carnot refrigeration cycle air refrigeration cycle
Week 14	vapor compression cycles comparison of refrigeration cycles absorption refrigeration
Week 15	heat pump liquefaction processes.
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	[1] Abbott, Michael M., Joseph M. Smith, and Hendrick C. Van Ness. "Introduction to chemical engineering thermodynamics." McGraw-Hill. [2] Elliott, J. Richard, and Carl T. Lira. "Introductory chemical engineering thermodynamics". Upper Saddle River, NJ: Prentice Hall PTR. [3] Narayanan, K. V.A chemical engineering thermodynamics. PHI Learning Pvt. Ltd..	yse
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	**Oil Refining**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	**7**				
SWL (hr/sem)	**210**				
Module Level			**Semester of Delivery**	4	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	-Allow students to gain knowledge, skills, and capacities in a variety of fields, with a concentration on chemical engineering and oil refinery engineering. -Permit students to develop a comprehensive understanding of the methodology through recognizing the origins of crude oil and classifying it according to international and Arab organizations; characterization and analysis methods of crude oil in petroleum laboratories; the principle work and operation processes of oil and gas engineering units in oil refinery projects; and crude oil treatment techniques through major and minor engineering units in crude oil projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students who succeeded in this course; 1Characters and analyze crude oil and operation process units in refinery projects. 2. Develop creative and critical thinking skills 3. Solve open-ended problems in refinery crude oil projects
Indicative Contents المحتويات الإرشادية	-The historical age of crude oil discovery (theories of its existence, crude oil and natural gas exploitation in energy generation, international and Arab oil organizations, distribution of oil refineries in Iraq) -Classification of crude oil hydrocarbon compounds (paraffin, olefins, bicyclic and unsaturated compounds); organic and inorganic materials, and heavy metals, and the effect of their presence on crude oil quality; and oil products (light, medium, and heavy) and their characteristics resulting from crude oil refining operations. -Characterizing and analytical calculations methods of crude oil through (specific gravity, API, flash point, freezing point, spill point, smoking point, aniline point, Characterization coefficient, viscosity, cetane number, and octane number). -Operations processes of oil refinery units (atmospheric distillation towers, vacuum, thermal cracking unit, desulfurization unit, polymerization unit, blending improvement unit for gasoline, metal pollutant removal unit, coking unit, and water treatment unit) -Mathematical methods for calculating boiling points according to (ASTM-D86, TBP, and EFV) -Crude oil treatment methods and hydrogen sulphide gas disposal units. -Computational methods for energy in crude oil (sensible heat, latent heat, heat capacity, heat of combustion, and heat of vaporization).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture, Demonstration, Discussion, Question and Answer, Drill and Practice, Problem Solving.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	102	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	108	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	210		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10%	3, and 6	
	Assignments	5	10%	3,5,7,10,12	
	Projects / Lab.	1	10%	1,2,3,4,5,6,7	
	Report	1	10%	1-14	
Summative assessment	**Midterm Exam**	2	20%		
	Final Exam	3	40%		
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	History and Development of Refining Processes Kinds of Refineries.
Week 2	Types of Petroleum Refinery Plant
Week 3	Refinery Feedstock and Products
Week 4	Products Composition of Crude Oil Refining
Week 5	Physical Property Characterization Data And Thermophysical Properties
Week 6	Physical Property Characterization Data and Thermophysical Properties
Week 7	Physical Property Characterization Data and Thermophysical Properties
Week 8	Mathematical Calculation of Physical Property Characterization Data and Thermophysical Properties
Week 9	Crude Oil Distillation
Week 10	Crude Oil Distillation
Week 11	Conversion between ASTM and TBP Distillation
Week 12	Fractionation Towers
Week 13	Mathematical Calculation of Crude Oil Distillation
Week 14	Treating Processes
Week 15	Crude Oil Pre-treatment and Mathematical Calculation of Thermal Properties
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Density
Week 2	Viscosity ASTM D455
Week 3	Flash point ASTM D92
Week 4	Flash point ASTM D93
Week 5	Distillation ASTM D86
Week 6	Smoke point for kerosene
Week 7	Carbon residue of oil

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Sinnott, R. A. Y. (2014). Chemical engineering design (Vol. 6). Elsevier. 2. Green, D. W., & Southard, M. Z. (2019). Perry's chemical engineers' handbook. McGraw-Hill Education. 3. Jones, D. S., & Pujadó, P. P. (Eds.). (2006). Handbook of petroleum processing. Springer Science & Business Media. 4. Gary, J. H., Handwerk, G. E., & Kaiser, M. J. (2007). Petroleum refining: technology and economics. CRC press.	
Recommended Texts	1.Meyers, R. A. (2016). Handbook of petroleum refining processes. McGraw-Hill Education. 2. Duval, S. (2022). Natural gas sweetening. Surface Process, Transportation, and Storage.	
Websites	https://link.springer.com/referencework/10.1007/978-3-319-05545-9 https://www.wiley.com/en-be/Petroleum+Refining+Design+and+Applications+Handbook,+Volume+1-p-9781118233696	

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 FORMنموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Properties of Engineering Materials**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**FA23**				
ECTS Credits	**4**				
SWL (hr/sem)	**120**				
Module Level		**UGII**	**Semester of Delivery**		**One**
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. 1. Explain the atomic structure and types of primary and secondary atomic and molecular bonding. 2. Explain the crystal structures and geometry and classify different classes of space lattices in crystalline solids. 3. Perform different types of mechanical testing for evaluation of mechanical properties of material. 4. Extract information of materials behavior from phase diagram. 5. Identify the structures, properties and applications of the main engineering materials (metals, alloys, polymers, ceramics and composites. 6. Explain corrosion mechanisms and types of corrosions and methods of corrosion prevention.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: 1. Mechanical Properties, stress-strain curve, elasticity, plasticity, ductility, young modulus, tensile stress, yield stress, bricking stress, true and engineering stress-strain diagram). 2. Knowledge of Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond. 3. Knowledge the Crystal structure, unit cell, types of unit cells simple cubic, Face centered cubic, body centered cubic, atomic packing factor, Previous lattice, Miller index, crystalline Planes, X-ray diffraction. 4. To Understanding the Phase diagrams 5. To know the Engineering Materials 6. To know Corrosion, Definition, why it happens, Type of corrosion, Dry and wet corrosion. Eight Form of corrosion. Mechanism of crevice corrosion 7. To know Methods of prevention and protection.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Introduction to types of engineering material classification and needs of engineering material. • Mechanical teste and calculations of engineering stress and strain values, • Plotting of thermal equilibrium phase diagrams • Understanding of hardness test, tensile test diagrams. • Classification of engineering material due to iron content • Ferrite and non-ferrite material • Types of ferrite material, steel, cast iron • Improvement of engineering mechanical properties due to metal additives weight percent. • Types of cast iron • Cooling curve due to metal and alloys

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6, 9,12	
	Assignments	2	10% (10)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	14	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to engineering material science and material science and needs of engineering materials study
Week 2	Classification of materials
Week 3	Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond.
Week 4	Crystal structure system ,examples and diagrams with definitions
Week 5	Previous lattice, Miller index, crystalline Planes, X-ray diffraction. packing facter
Week 6	Definition of alloys, binary alloys, phase diagrams (equilibrium thermal diagrams), eutectic; solid solution
Week 7	solid solution and combination type diagram, Iron-carbon face diagram
Week 8	Iron-carbon cooling curve, phases, reactions, and multi phases
Week 9	Types of thermal equilibrium diagrams
Week 10	Mechanical test and some types
Week 11	corrosion
Week 12	Composite material
Week 13	Powder methodology
Week 14	Types of furnaces
Week 15	Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1& 2	Safety in laboratory
Week 3	How to write a scientific report
Week 4	Tensile test
Week 5 & 6	Compression test with report discussions
Week 7	Bending test
Week 8-9	Twesting test with reports discussions

Week 10	Impact test
Week 11	Hardness test
Week 12	Image microscopic investigations with preparation sample process
Week 13	Scientific visit or reports data checking
Week 14	Dissection of report or creep test
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	[1] MATERIALS SCIENCE and ENGINEERING, by, William D. Callister, Jr. David G. Rethwisch, Wiley Binder Version ISBN: 978-1-118-47770-0, 2000 John Wiley & Sons [2] Van Vlack, Elements of Material Science [3] Khanna O.P., A Text Book of Material Science & Metallurgy [4] Fontana, M.G., "Corrosion Engineering", McGrawHill. [5] Jones, D.A., "Principal and Protection of Corrosion", PrenticeHall	yes
Recommended Texts	Newnes Engineering Materials Pocket Book 1st Edition - January 1, 1987 Author: W. Bolton	no
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering statistics**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**4**				
SWL (hr/sem)	**120**				
Module Level	UGII		**Semester of Delivery**	**4**	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	no		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	It's used for experimental design. It's used for analyzing results of experiments It's used to find a mathematical model for experiments. It's used for comparing between theoretical model and experimental data.	**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	2. Introducing the student to the importance of statistics and its relationship to engineering sciences. 3. clarifying the fields in which it is used and the purpose of using it, as well as identifying the applied methods necessary to diagnose and solve problems and applying them to ready-made programs, for example, Microsoft excel 2007 electronic spreadsheet program. 4. The student acquires practical skills in the areas of using statistical methods. 5. applications and data collection methods Presented in various ways and applications of measures of central tendency, measures of dispersion, correlation, regression, and solving equations using matrices and determinants.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: 1. Identify modern concepts of statistics, emphasizing applications to quality engineering and improvement, process capability and control and reliability assessment. 2. Demonstrate the use of statistical software tools to solve problems. 3. Employ statistical methods to perform statistical quality control, design of experiments and reliability analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following:
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	1. Introduction to Statistic. 2. Graphical methods for describing Quantitative Data: An Introduction to Descriptive Statistics.
Week 2	1.frequency distribution. 2.relative frequency. 3.Computer Exercises: Pie chart, Histogram, steam and leaf, dot plot.
Week 3	1.Numerical methods for describing quantitative data: Measures of Central Tendency: arithmetic mean, median.
Week 4	1. variance, standard deviation, and mode. 2. Measures of Relative Standing: percentiles and quartiles. 3. Methods of detecting outliers (Range)
Week 5	Types of Random Variables: 1.Discrete Random Variables. 2. Continuous Random Variables.
Week 6	1. Normal Distributions and Interval Tests 2. Introduction to the normal distribution.
Week 7	Testing for a normal distribution. Sampling Distributions.

	Estimation using Confidence Intervals
Week 8	6. Statistical Inference and Significance Testing: Introduction to Estimation, Types of Estimates.
Week 9	Confidence interval, Hypothesis Tests, Type I and type II errors
Week 10	Chi-square value, one and two tails tests. Significance tests for population means.
Week 11	Comparing two sample means. Wilcoxon signed-rank and Mann–Whitney tests. Applications
Week 12	Design of experiments: 2 nd and 3rd factorial experiments.
Week 13	graphic presentation, confounding, quality improvement
Week 14	Taguchi Design of Experiments.
Week 15	ANOVA, P-value, Fisher's test.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1& 2	General definitions of Excel and MATLAB environment.
Week 3	Learn about commands for statistical measures.
Week 4	Practical application 1.frequency distribution. 2.relative frequency. 3.Computer Exercises: Pie chart, Histogram, steam and leaf, dot plot.
Week 5 & 6	1.Numerical methods for describing quantitative data: Measures of Central Tendency: arithmetic mean, median. 1. variance, standard deviation, and mode. 2. Measures of Relative Standing: percentiles and quartiles. 3. Methods of detecting outliers (Range)
Week 7	Types of Random Variables: 1.Discrete Random Variables. 2. Continuous Random Variables. 1. Normal Distributions and Interval Tests 2. Introduction to the normal distribution. Testing for a normal distribution. Sampling Distributions. Estimation using Confidence Intervals
Week 8-9	Statistical Inference and Significance Testing: Introduction to Estimation, Types of Estimates.

	Confidence interval, Hypothesis Tests, Type I and type II errors Chi-square value, one and two tails tests. Significance tests for population means.
Week 10	Chi-square value, one and two tails tests. Significance tests for population means. Comparing two sample means. Wilcoxon signed-rank and Mann–Whitney tests. Applications
Week 11	Design of experiments: 2 nd and 3rd factorial experiments.
Week 12	graphic presentation, confounding, quality improvement
Week 13	Taguchi Design of Experiments.
Week 14	ANOVA, P-value, Fisher's test.
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. David M. Levine, Patricia P. Ramsey, & Robert K. Smith. Applied Statistics for Engineers and Scientists: Using Microsoft Excel & Minitab. Prentice-Hall, 2001 2. Thomas J. Lorenzen & Virgil L. Anderson. Design of Experiments: A No-name Approach.m. Dekker.1993. 4. William Mendenhall & Terry Sincich. Statistics for Engineering and the Sciences, 5th Edition. Prentice-Hall, 2007	no
Recommended Texts	1. Douglas C. Montgomery, Design and Analysis of Experiments, 7 Edition, Wiley, July 2008.	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	**Environmental Pollution & industrial safety**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☒**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☒**Seminar**	
Module Code					
ECTS Credits	**4**				
SWL (hr/sem)	**59**				
Module Level		UGII	**Semester of Delivery**		**4**
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name		no	**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To know the environmental pollution and chief elements of the environment. 2. To know the types of pollutants in air, water, and earth's crust. 3. To the knowledge of the methods for treatment for wastewater. 4. To know of the pollution of air and the controlling of it. 5. To the knowledge of the radioactive pollution.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: 1. Introduction in environmental pollution. 2. To know the chief of elements of environment. 3. To the knowledge of the types for pollution and pollutants. 4. To know the important of pollutants for water. 5. Understanding the wastewater pollution and some control processes of wastewater. 6. To the knowledge of the types of wastewater treatment process. 7. To know the pollutants of air. 8. To know of the emissions from the oil and natural gas industry. 9. Understanding of the solutions for air pollution. 10. To know of the radioactive pollution: sources, and control. 11. To the knowledge of the sources and types of solid waste. 12. To know what kind of damage of oil and gas pollution cause.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Introduction of the elements of the environment. (2 hr) 2. To the knowledge of the environmental pollution. (2 hr) 3. To the knowledge of the types for pollution and pollutants. (4 hr) 4. Choice of the appropriate of methods for treatment for wastewater. (4 hr) 5. To know who to solutions and controlling for air pollution. (4 hr) 6. To the knowledge of the sources for radioactive pollution. (4 hr) 7. To know for kind of the sources and types of solid waste. (4 hr) 8. To the knowledge of the environmental pollution resulting from the oil and gas industries. (4 hr)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignments, written exam, quizzes, seminars, and Online testing.

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	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	5% (5)	3, 6, 9, 12	
	Assignments	5	5% (5)	6, 12	
	Projects / Lab.	0	0% (0)	-	
	Report	0	0% (0)	-	
Summative assessment	**Midterm Exam**	2 hr	40% (40)	7	
	Final Exam	2hr	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Environmental Pollution**
Week 2	**Elements of Environment**
Week 3-4	**Pollution and Pollutants**
Week 5-6	**Sources of Water Pollution**
Week 7-8	**Wastewater Pollution and Some Control Processes of Wastewater**.
Week 9-10	**Sources of Air Pollution**
Week 11	**Radioactive Pollution**
Week 12-13	**Solid waste**
Week 14	**Environmental Pollution Resulting from the Oil and Gas industries**
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Requirements that must be observed while working in the laboratory
Week 2	Identify the laboratory devices and equipment available in the laboratory and indicate the method of preparing reports.
Week 3	**Learn about water pollutants and methods of measuring them:** 1- pH and electrical conductivity

Week 4-5	2- Total suspended solids (TDS), dissolved solids (TSS) and turbidity
Week 6	3- Chloride and residual chlorine
Week 7-8	4- Total tardiness
Week 9	5- Sulfate
Week 10	6- Oil.
Week 11	**Measurement of gaseous pollutants in the air:** 1- Carbon dioxide (CO) and carbon monoxide (CO_2).
Week 12	2- Nitrogen oxides and sulfur dioxide.
Week 13	3- Methods for measuring dust by a dust collector.
Week 14	4- Methane.
Week 15	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Ruth F. Weiner and Robin A. Matthews, 2003, "Environmental Engineering", 4th edition. - P. Aarne Vesilind, J. Jeffrey Peirce, Ruth F. Weiner, 1994, "Environmental Engineering". - American Public Health Association, American Water Works Association, Water Environment Federation.Standard, 2023 "Methods for the Examination of Water and Wastewater", 24th Edition.	no
Recommended Texts	- P. Aarne Vesilind, Susan M. Morgan, Lauren G. Heine, 2009, "Introduction to Environmental Engineering".	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	**Fluid Mechanics**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	**UGII**		**Semester of Delivery**	**4**	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics, Thermodynamics	**Semester**	1
Co-requisites module	Mathematics (1)	**Semester**	1,2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. This module fluid mechanics is intended to develop a deeper understanding of the relationship between design and analysis processing as this module discusses various fluid systems.. 2. The student will be able to analyze simplified fluid problems with the aim of reduction of energy losses and manpower. The student will be able to identify/control the appropriate process parameters, and possible defects of processes malfunctions so as to remove them. 3. For each fluid process, the aspects covered include: aesthetics, principles, choices of materials, choice of processes, properties of materials, advantages and disadvantages, process economics. Examples are drawn from practical processes mainly used in aerospace, automotive and airconditioning industries. 4. To introduce the theory and practice of fluid machines parts and assemblies using a wide range of technologies. 5. To allow processes to be chosen appropriately for any given application with any given fluid material. 6. To develop group working, research and writing skills. 7. To provide knowledge on the influence of thermal and mechanical parameters on system structure.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Examine fluid processes to describe the system properties of fluid devices. 2. Calculate and measure the fluid behavior in thermal processes. 3. Define the characteristics of various fluid operations. 4. Choose appropriate processes for different parts. 5. Design parts such that they are suitable for energy utilization using appropriate techniques. 6. Graduates from this module will be skilled in the methods of scientific investigation. 7. They will be able to think as a fluid engineer, critically evaluating scientific information and solving scientific problems. 8. will be able to effectively communicate scientific information.
Indicative	1) Introduction to Fluid Mechanics. 1. Fluid Properties.

Contents المحتويات الإرشادية	2. density. 3. viscosity. 4. pressure. 5. Shear stress. 2) Fluid Statics. a) Pressure Distribution. b) Forces. c) Buoyancy. d) Manometers. 3) Fluid Dynamics a) Momentum b) Control Volume c) Energy d) Continuity 4) Fluid machines and hydraulics

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Quizzes and tests throughout the semester to check understanding and knowledge 2. Examinations, both written and practical, that assess learners' understanding of concepts, principles, and theories related to Fluid Processes 3. Observation of learners' practical skills in laboratory and workshop based or simulated settings. 4. Peer evaluation and feedback tools used as part of group projects or reciprocal feedback assignments. 5. Assignments and essays used to assess learners' comprehension of theoretical concepts. 6. Presentation and demonstration of acquired knowledge in real-world scenarios.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	87	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10%	5, 10	
	Assignments	1	5%	9	
	Projects / Lab.	1	10%	continuous	
	Report	1	5%	12	
Summative assessment	**Midterm Exam**	2hr	10%	7	
	Final Exam	3hr	60%	15	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fluid Properties
Week 2	Deriving Pressure equation in fluids
Week 3	Manometry and pressure measurements.
Week 4	fluid forces on vertical surfaces
Week 5	Force on inclined surfaces and center of pressure
Week 6	fluid forces on curved surfaces
Week 7	Buoyancy and metastable center

Week 8	Fluid dynamics applications
Week 9	Control volume concept
Week 10	Continuity
Week 11	Momentum of fixed control volume
Week 12	momentum of moving control volume and inertial systems
Week 13	Energy equation as applied to fluid systems
Week 14	Fluid machinery and hydraulics.
Week 15	**Final exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Fluid properties (density)
Week 2	Fluid properties (viscosity)
Week 3	Pressure distribution
Week 4	Vertical gates
Week 5	inclined gates
Week 6	fluid forces on different types of surfaces
Week 7	improving metastable center
Week 8	Introduction fluid dynamics (laminar flow)
Week 9	Introduction fluid dynamics (turbulent flow)
Week 10	Continuity
Week 11	fixed turbomachines blades
Week 12	moving turbomachines blades
Week 13	Report
Week 14	**Final exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Streeter, Mikell P. Fluid Mechanics. 2. Fox, Fluid Mechanics. 3. F. White, Elementary Fluid Mechanics.	yes
Recommended Texts	None	
Websites	None	

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.

قسم هندسة تقنيات الوقود والطاقة

المرحلة الثالثة

مسار بولونيا

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Heat Transfer 1		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code				
ECTS Credits	6			
SWL (hr/sem)	180			
Module Level	UGIII	**Semester of Delivery**	Five	
Administering Department	Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader		**e-mail**		
Module Leader's Acad. Title		**Module Leader's Qualification**	.	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**	*dr*	
Scientific Committee Approval Date		**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. To Analyze heat conduction, forced convection and Free convection. 2. To Explain basic physical processes of condensation and boiling. 3. To Analyze basic heat transfer experiments. 4. To Analyze heat transfer by radiation using shape factors and networks. 5. To Use LMTD and NTU-Effectiveness methods to predict the size and performance of heat exchangers. 6. To Design of heat exchangers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to analyze basic heat transfer 2. Ability to analyze heat conduction 3. Ability to solve numerical heat conduction 4. Ability to solve fin problems 5. Ability to build heat conduction network 6. Ability to explain the forced convection 7. Ability to explain Free convection. 8. Ability to Explain basic physical processes of condensation and boiling. 9. Ability to analyze heat transfer by radiation using shape factors and networks. 10. Ability to Use LMTD and NTU-Effectiveness methods to predict the size and performance of heat exchangers. 11. Ability to Design of heat exchangers.
Indicative Contents المحتويات الإرشادية	<u>Introduction</u> Heat transfer – Units. Types of heat transfer- thermal conductivity [15 hrs.] <u>Conduction Heat Transfer</u> Definitions, thermal resistance, electric analog, Heat conduction through the plane, cylinder and spherical walls. [15 hrs.] <u>Temperature distribution</u> Temperature distribution through plane wall, cylindrical, and spherical wall Composite wall ,heat transfer coefficient, The overall of heat transfer coefficient. Insulations, critical thickness of insulation [10 hrs.] <u>Fins</u> Fins Types, Types of Temperature distribution along fins, Annular fine calculation, application[10 hrs.] <u>Conduction into 2D</u> Analytical and Numerical solutions [8 hrs.] <u>Convection Heat Transfer</u> Forced convection, flow over flat plat, Application of forced convection,

	dimensionless numbers. Thermal and velocity boundary layers. Force convection flow into pipe laminar and turbulent flows [12 hrs.] <u>Free convection</u> Thermal and velocity boundary layers [7 hrs.] <u>Heat exchangers</u> Types of heat exchangers. Logarithm mean temperature difference (LMTD). Single pass and multipass heat exchangers; plate heat exchangers; heat exchangers effectiveness; Design of heat exchanger using NTU. Fouling factors and Wilson's plot. [15 hrs.] <u>Evaporation and Condensation</u> Boiling, types of boiling, Boiling curve, imperials relations. types of condensations, empirical relations[15 hrs.] <u>Radiation Heat transfer</u> Concept of thermal radiations - Black body - Stefan Boltsman's law - grey body – radiation between surfaces. [12 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 are 15. Teamwork 16. Visualization 17. Inquiry-Based Teaching 18. Student-led Classroom 19. Implementing Technology in the Classroom 20. Auditory strategies 21. Reading & Writing

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Definitions Units and symbols Theory of Heat Transfer Thermodynamics and Heat Transfer

Week 2	Heat Transfer Mechanism Conduction Heat Transfer Convection Heat Transfer Radiation Heat Transfer
Week 3	Thermal Resistance and Electric Analog Heat Conduction Through the Plane, Cylinder, Spherical Walls,
Week 4	Numerical Methods in Heat Conduction 1D, 2D, 3D Transient Heat Conduction
Week 5	Convection Heat Transfer Dimensionless Numbers
Week 6	Free (internal and external) Convection Heat Transfer Forced (internal and external) Convection Heat Transfer
Week 7	Radiation Heat Transfer Definitions Thermal Radiations, Black Body Radiations
Week 8	Radiation Between Surfaces (View Factor Relations) Atmospheric And Solar Radiation
Week 9	Boiling and Condensation Definitions Types of Boiling
Week 10	Boiling Curve Types of Condensations
Week 11	Fins Definitions Types of Fins
Week 12	Types of Temperature Distribution Along Fins Annular Fine Calculation
Week 13	Heat Exchangers Definitions Types of Heat Exchangers
Week 14	Logarithm Mean Temperature Difference (LMTD) and Effectiveness Design of Heat Exchanger Using NTU
Week 15	Fouling Factors And Wilson's Plot.

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: calculation of thermal conductivity
Week 2	Lab 2: calculation of heat transfer series wall
Week 3	Lab 3: calculation of thermal contact resistance
Week 4	Lab 4: heat transfer in very long fin
Week 5	Lab 5: estimation of heat transfer coefficient in fins
Week 6	Lab 6: steady two dimensional in plate
Week 7	Lab 7: forced convection from cylinder in cross flow

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Hollman J.P., Heat Transfer, McGraw Hill Kern D.Q., Process Heat Transfer, McGraw Hill.	yse
Recommended Texts	Heat-transfer- [YUNUS A. CENGEL]	yes
Websites	https://www.udemy.com/topic/heat-transfer/	

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	**Energy Resources**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	150				
Module Level		**UGIII**	**Semester of Delivery**		**Five**
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name		no	**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Understand the difference between renewable and nonrenewable energy resources. 2- Demonstrate understanding of the different types of renewable energy technologies that are currently available, and how they are used to provide energy. 3- Identify the current major uses of energy (i.e., in agriculture, manufacturing, transportation, 4- residential, etc.). 5- Distinguish between an energy source, a resource and a carrie. 6- Differentiate between energy reserves and resource base.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Students are expected to be able to demonstrate understanding of: Make interpretation about the energy sources. • Comprehend the energy and energy types. • Make interpretation about the solar energy. • explain the solar energy power plants. • Explain the solar energy collectors. • Make interpretation about the geothermal energy. • Explain the production of electricity from geothermal fluid. • Explain the potential of geothermal energy. • Make interpretation about the wind energy. • Explain the production of electricity from wind energy. • Make interpretation about the hydrogen energy. • Explain the production of energy method from hydrogen. • Explain the production ofBiogas and CH4 from **Biomass .** • Nuclear Energy: (3 Weeks) • Make interpretation about theKinds of nuclear energy, Kinds of Nuclear reactors
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: -Energy resources are all forms of fuels used in the modern world, that can produce heat, power life, move objects, generate electrical energy, or for other forms of energy conversion processes. Energy resources can be roughly classified in three categories: **Non-Renewable Sources-Renewable Sources -Alternate Emerging Energy Sources.(8hr)** Advantages and Disadvantages for energy resources (8hr) Agricultural residue or agro-residue describes all organic material produced as by-products afterharvesting and processing of agricultural crops. Agro-residues are non-wood and a rich source ofcellulose with lignin. These may include

	stalk, cane, seed pod and leaves etc. Agro-residues are annuallyrenewable and abundantly available at lower price. Agro-residues are of two types:(12 hr) Nuclear power is a clean and efficient way of boiling water to make steam, which turns turbines to produce electricity. In all nuclear power plants, the process of making electricity causes radioactivity. The radioactivity comes from the atom. Atom consists of nucleus and electrons in orbits. Energy is obtained from the nucleus in the following methods: 1. Nuclear Fusion: Breaking a heavy nucleus into 2 or more than 2 smaller lighter nuclei. 2. Nuclear Fission: Combining 2 lighter nuclei to form a heavy nucleus.(10 hr)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	**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/Nu	**Weight (Marks)**	**Week Due**	**Relevant Learning**

		mber			Outcome
Formative assessment	Quizzes	4	10% (10)	3,6, 9,12	
	Assignments	2	10% (10)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	14	
Summative assessment	Midterm Exam	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction** The importance of energy
Week 2	**Fuel** Fuel, fuel classifications, Energy,
Week 3	renewable and non-renewable energy,
Week 4	characteristics of energy resources, energy conversion.
Week 5	**Non Renewable Sources of Energy**
Week 6	Petroleum, oil reservoirs, compositions
Week 7	volumetric calculation of oil reserve and recovery factor
Week 8	**Solid fossil fuel** Definitions**,** Characteristics, kinds, ,
Week 9	Coal analysis

Week 10	Heating value calculation for coal.
Week 11	Wood Characteristics, kinds, and Wood Heating value
Week 12	**Natural Gas** Definitions, characteristics, kinds, Heating value for gaseous fuel.
Week 13	**Renewable Sources of Energy: Hydrogen Energy** Methods of Hydrogen generations, Hydrogen storage and fuel cells, applications
Week 14	**Biomass Energy** Biogas, Biogas utilization units, Biodiesel, Recycling Energy corps, Applications and limitations of Bio energy
Week 15	**Nuclear Energy** Kinds of nuclear energy, Kinds of Nuclear reactors, applications **Energy Economics**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1&	Safety in laboratory
Week 2-3-4	How to write a scientific report: The seven hands-on laboratory experiments demonstrated the principles of the; flywheel, solar pathfinder, photovoltaic powered motor, hydroelectricity, wind turbine, thermoelectricity, and a fuel cell. In order to record the level of improvement of the class,

	دكتورة هذا مقترح انه يتم اعداد تقارير حول مواضيع مصادر الطاقة المختلفة
Week 5 & 6	
Week 7	
Week 8-9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Goldmberg J., Johansson, Reddy A.K.N. , Energy for a Sustainable World, John Wiley 2. Bansal N.K., Kleeman M. & Meliss M., Renewable Energy Sources & Conversion Tech.,Tata ,McGraw Hill.	no
Recommended Texts		no
Websites		

Grading Scheme

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

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

MODULE DESCRIPTION FORM

نموذج وصفالمادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Internal Combustion Engines			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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	7. To Analyze Engine components and basic engine nomenclature. I.C. 8. To Explain Four stroke SI Engines and CI Engines. Two stroke Engines. 9. To Analyze Fundamental differences between SI Engines and CI engines. 10. To Analyze the Ideal or air standard cycles. 11. To study the Carnot cycle, Otto cycle, Diesel cycle, dual combustion cycle. 12. To Analyze the Engine Parameters. 13. To study the Hydrocarbon Fuels-Gasoline. 14. To Analyze the Carburetion system. 15. To Analyze the Heat release pattern and fuel injection 16. To Explain Types of injection systems 17. To Explain Lubrication principles. 18. To Explain Necessity of Engine cooling systems. 19. To Analyze the Objects of supercharging.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to Analyze Engine components and basic engine nomenclature. I.C. 2. Ability to Explain Four stroke SI Engines and CI Engines. Two stroke Engines. 3. Ability to Analyze Fundamental differences between SI Engines and CI engines. 4. Ability to Analyze the Ideal or air standard cycles. 5. To study the Carnot cycle, Otto cycle, Diesel cycle, dual combustion cycle. 6. Ability to Analyze the Engine Parameters. 7. Ability to study the Hydrocarbon Fuels-Gasoline. 8. Ability to Analyze the Carburetion system. 9. Ability to Analyze the Heat release pattern and fuel injection 10. Ability to Explain Types of injection systems 11. Ability to Explain Lubrication principles. 12. Ability to Explain Necessity of Engine cooling systems. 13. Ability to Analyze the Objects of supercharging.
Indicative Contents المحتويات الإرشادية	**Introduction** Introduction to internal combustion engine. Terminology, TDC & BDC, Stroke &swept volume, compression ratio [15 hrs.] **I.C.E. Classification** Engine components and basic engine nomenclature. I.C. Engines classifications. Four stroke SI Engines. Four stroke CI Engines. [15 hrs.] **Air Standard Cycles** Introduction. Ideal or air standard cycles. Useful thermodynamic relations. The Carnot cycle. The Otto cycle. The Diesel cycle. [8 hrs.]

Operating Characteristic (Indicated and Effective values)
Engine Parameters. Work. Mean Effective Pressure. Torque and Power. Air-Fuel Ratio and Fuel-Air Ratio. Specific Fuel Consumption. [10 hrs.]

Fuels and Combustion
Hydrocarbon Fuels-Gasoline. Some Common Hydrocarbon Components. Self-Ignition and Octane Number. Diesel fuel. Chemical equilibrium. [15 hrs.]

Mixture Preparation in S.I Engines
Carburetion. Mixture requirements for steady state operation. Distribution. Transient mixture requirements. A simple or elementary carburetor. [10 hrs.]

Fuel Injection
Heat release pattern and fuel injection. Requirements of a diesel injection system. Types of injection systems. Fuel pump. [8 hrs.]

Ignition
Ignition system requirements. Battery ignition system. Magneto ignition system. Ignition Timing. Spark plugs. [8 hrs.]

Combustion in Spark Ignition Engines
Stages of combustion in S.I.E. Abnormal combustion. Ricardo's theory of combustion chamber. [12 hrs.]

Combustion in Compression Ignition Engines
Combustion stages in C.I engines. Factors effecting on ignition delay. Type of combustion chamber in C.I engines. [15 hrs.]

Lubrication System in I.C Engines
Lubrication principles. Function of lubrication. Properties of lubricating oil. Classification of lubricating oils. Oil Filters. [10 hrs.]

Cooling System in IC Engines
Necessity of Engine cooling. Air Cooling. Water-cooling. Comparison of air and water-cooling systems. Radiators. [10 hrs.]

Supercharging
Objects of supercharging. Thermodynamic cycle with supercharging. Supercharging of spark ignition engine. [10 hrs.]

Rotary Engines
The working principle. Features of the rotary engines. Engine geometry. Combustion in rotary engines. Applications of rotary engines. [15 hrs.]

Air Pollution

	Pollutants from gasoline engines. Emission control for Gasoline engine. Diesel emission. Diesel smoke and control. [8 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 are 22. Teamwork 23. Visualization 24. Inquiry-Based Teaching 25. Student-led Classroom 26. Implementing Technology in the Classroom 27. Auditory strategies 28. Reading & Writing

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to internal combustion engine. Terminology, TDC & BDC, Stroke &swept volume, compression ratio
Week 2	I.C.E. Classification Engine components and basic engine nomenclature. I.C. Engines classifications. Four stroke SI Engines. Four stroke CI Engines. Two stroke Engines. Fundamental differences between SI Engines and CI engines. Application of IC Engines. First law analysis of engine cycle-energy balance.
Week 3	Air Standard Cycles Introduction. Ideal or air standard cycles. Useful thermodynamic relations. The Carnot cycle. The Otto cycle. The Diesel cycle. The dual combustion cycle. Comparison of Otto, Diesel, and dual combustion cycles.
Week 4	Operating Characteristic (Indicated and Effective values) Engine Parameters. Work. Mean Effective Pressure. Torque and Power. Air-Fuel Ratio and Fuel-Air Ratio. Specific Fuel Consumption. Engine Efficiencies. Volumetric Efficiency. Emissions.
Week 5	Fuels and Combustion Hydrocarbon Fuels-Gasoline. Some Common Hydrocarbon Components. Self-Ignition and Octane Number. Diesel fuel. Chemical equilibrium. Combustion temperature. Adiabatic flame temperature. Liquid and gaseous combustion.
Week 6	Mixture Preparation in S.I Engines Carburetion. Mixture requirements for steady state operation. Distribution. Transient mixture requirements. A simple or elementary carburetor. Complete carburetor. Carburetor types. Theory of simple carburetor. Aircraft carburetor. Petrol injection. The Lucas petrol injection. Electronic fuel injection. Advantage and disadvantage of petrol injection.
Week 7	Fuel Injection Heat release pattern and fuel injection. Requirements of a diesel injectionsystem. Types of

	injection systems. Fuel pump. Types of fuel injectors. Injection nozzles. Quantity of fuel per cycle, size of nozzle orifice. Spray formation. Spray direction. Injection timing.
Week 8	Ignition Ignition system requirements. Battery ignition system. Magneto ignition system. Ignition Timing. Spark plugs. Disadvantage of conventional system. Electronic ignition system. Factors affecting spark plug operation.
Week 9	Combustion in Spark Ignition Engines Stages of combustion in S.I.E. Abnormal combustion. Ricardo's theory of combustion chamber. Basic types of combustion chamber in S. I. Engines.
Week 10	Combustion in Compression Ignition Engines Combustion stages in C.I engines. Factors effecting on ignition delay. Type of combustion chamber in C.I engines.
Week 11	Lubrication System in I.C Engines Lubrication principles. Function of lubrication. Properties of lubricating oil. Classification of lubricating oils. Oil Filters. Lubrication systems. Engine performance and lubrication.
Week 12	Cooling System in IC Engines Necessity of Engine cooling. Air Cooling. Water-cooling. Comparison of air and water-cooling systems. Radiators.
Week 13	Supercharging Objects of supercharging. Thermodynamic cycle with supercharging. Supercharging of spark ignition engine. Supercharging of C.I engine. Supercharging limits. Methods of supercharging. Turbo charging. Methods of Turbo charging. Limitations of Turbo charging.
Week 14	Rotary Engines The working principle. Features of the rotary engines. Engine geometry. Combustion in rotary engines. Applications of rotary engines.
Week 15	Air Pollution Pollutants from gasoline engines. Emission control for Gasoline engine. Diesel emission. Diesel smoke and control. Comparison of diesel and gasoline emissions. Air pollution from gas turbine.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction & Classifications of Internal Combustion Engines
Week 2	Lab 2: Performance & Testing of IC Engines
Week 3	Lab 3: Effects of Operation Variables on Engine Performance
Week 4	Lab 4 : Chemical Correct Ratio for Air-Fuel Mixture
Week 5	Lab 5: Air-Fuel Mixture Calculations
Week 6	Lab 6: Experimental analysis for Exhaust Gases
Week 7	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	[1] Engineering fundamentals of the internal combustion engines by Willard P. [2] Internal combustion engines, by Mathur and Sharma [3] Internal combustion engines applied thermo sciences by Colin F. and Allan T. [4] Introduction to I.C.E by J.B Heywood.	yse
Recommended Texts		
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	1- To define the types of the first order ordinary differential equations and explain the most important standard methods for solving such equations in the engineering applications. 2- To define the types of the second and high orders ordinary differential equations, and explain the methods for solving such equations in the engineering applications. 3- To define the Fourier series, odd and even periodic functions and explain the methods for solving such series during the engineering applications. 4- To define the Gamma Function and explain the methods for solving integrals using gamma function in the engineering applications. 5- To define the Laplace Transforms and Inverse transforms and explain the methods for solving Differential equations by Laplace Transforms during the engineering applications. 6- To describe the methods for solving the Partial Differential Equations connected with various physical and geometrical applications.
Module Learning Outcomes	Upon completion of the course, students should be able to: 1. Understand the methods of solutions for first order differential equations and their engineering applications. 2. Understand the methods of solutions for second and high orders differential equations and their engineering applications. 3. Understand the method of solution for Fourier Series and their engineering applications. 4. Understand the methods for solving integrals using gamma function with their applications. 5. Understand the methods of solution by Laplace transformation and their applications. 6. Understand the methods of solution for partial differential equation and their engineering application.
Indicative Contents	Indicative content includes the following. 1. Differential equations classification, first order methods of solutions, engineering applications of first order differential equations. [6 hrs] 2. Introduction of the linear differential equation of the second and nth orders, Homogeneous and Non-Homogeneous Linear ODEs with constant Coefficients, methods of solutions, engineering applications) [6 hrs] 3. Fourier series, Even and Odd Functions, Applications of the Fourier series in the engineering field. [6 hrs]

	4. Gamma function definition, evaluation of Gamma Function, extension of definition of Gamma Function, Applications of Gamma Function. [6 hrs] 5. The Laplace transformation definition, Laplace Transforms of Some Simple Functions, Application of Hyperbolic Functions, Inverse Laplace Transform, Solution of Differential Equations using Laplace transforms, Solution of System of ODEs. [6 hrs] 6. The partial derivatives definition, Basic Concepts of PDEs, Formation of Partial Differential Equations, Engineering Applications. [6 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL)
الحمل الدراسي للطالب

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
Week 1	First order differential equations, Special cases of first order D.E.
Week 2	First order differential equations engineering applications.
Week 3	Second order linear equation with constant coefficients.
Week 4	Second order linear equation engineering applications.
Week 5	High order linear differential equations , Integral operators.
Week 6	High order linear differential equations engineering applications.
Week 7	Fourier series, even and odd functions .
Week 8	Fourier series engineering applications.
Week 9	Gamma Function and integral solution.
Week 10	Gamma Function applications
Week 11	Laplace transformation, Inverse Laplace transformation, Laplace transformation to solution for differential equations.
Week 12	Laplace transformation engineering applications.
Week 13	Partial differential equations, solution by separation method.
Week 14	Partial differential equations solution of their engineering applications.
Week 15	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Recommended Texts	1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc. 2. Advanced Engineering Mathematics, Peter V. O'Neil, Thomson Brooks/Cole. 3. Advanced Engineering Mathematics, A.B. Mathur & V.P. Jaggi, Khanna Publishers. 4. Advanced Engineering Mathematics, Wyle Barrett /fifth edition.	No

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mass Transfer 1**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Fundamentals	**Semester**	L1-S2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	To introduce the basic principles of chemical engineering separation processes and mass transfer and then proceed to study the design and operation of separation processes units operation such as distillation, gas-liquid absorption and stripping, liquid-liquid extraction, adsorption and crystallization.
Module Learning Outcomes	At the end of the course, students are able to: 1. Solve simple problems involving diffusion. 2. Apply analogies to obtain transport coefficients. 3. Use stage equations to perform calculation in binary distillation and gas absorption designs. 4. Calculate number of stages in multi-components distillation column. 5. Choose suitable methods to calculate number of stages or height of distillation and gas absorption column. 6. Calculate number of stages in liquid extraction tower
Indicative Contents	Indicative content includes the following. Mass transfer: Integral and differential mass/mole balances.Fick's first and second laws for binary mass transfer. Mass transfer in turbulent flow. Film theory models. Molecular diffusion in gases, liquids and solids; diffusivity measurement and prediction; multi-component diffusion. Eddy diffusion, concept of mass transfer coefficients, theories of mass transfer, different transport analogies, application of correlations for mass transfer coefficients, inter phase mass transfer, relationship between individual and overall mass transfer coefficients. NTU and NTP concepts, Stage-wise and differential contractors. Binary Continuous Distillation: McCabe-Thiele method. Design considerations: feed stage location, minimum reflux/boilup ratio, minimum number of stages Absorption & Stripping: Minimum flow rate, Number of equilibrium stages. Stage efficiency, Packed columns. Humidification–Equilibrium, humidity chart, adiabatic and wet bulb temperatures; humidification operations; theory and design of cooling towers,

	dehumidifiers and humidifiers using enthalpy transfer unit concept.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	106	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3,5,6,10	LO #1,2,…..10
	Assignments	2	10% (10)	7, 8	LO # 8
	Seminar	1	10% (10)	11	LO # 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	12	LO # 1-12
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
Week 1	Introduction
Week 2	Diffusion: Mechanism and Theory
Week 3	Diffusion in a Stagnant Layer
Week 4	Equimolar and Unequimolar Counter Diffusion
Week 5	Diffusion Through Varying Area, Multi-component diffusion, prediction of diffusivity, Diffusion in gases and liquids.
Week 6	Distillation: Introduction of distillation
Week 7	Binary Flash Distillation,
Week 8	Fractionation Distillation
Week 9	Number of stages by McCabe-Thiele and Lewis-Sorel Methods,
Week 10	Number of stages at total reflux and Minimum Reflux Ratio, Distillation Efficiency
Week 11	Multi-component Distillation
Week 12	Exact Computation and Short Cut Method,
Week 13	bubble and dew point calculations.
Week 14	Design of distillation
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: determine the Liquid phase mass transfer mass transfer coefficient in a wetted wall column
Week 2	Lab 2: determine the diffusion coefficient of an organic vapour i.e. CCl4 in Air
Week 3	Lab 3: To study the effect of temperature on the diffusion co-efficien
Week 4	Lab 4: o determine the mass transfer coefficient in Humidification and Dehumidification
Week 5	Lab 5: determine the Vapour-Liquid Equilibrium (VLE) curve for theCCl4toluene mixture(Computerized)
Week 6	Lab 6: determine the Vapour-Liquid Equilibrium (VLE) curve for the CCl4 toluene mixture
Week 7	Lab 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	➢ T.K.Sherwood, R.L.Pigford and C.R.Wilke, Mass Transfer, McGrawHill, ➢ Coulson & Richardson's ,"Chemical Engineering" volume 2 , (2003) ➢ Binay K. Dutta "Principle of Mass Transfer and Separation Processes" ➢ Treybal, R.E., 'Mass Transfer Operations", 3rd edition, 1980, McGraw Hill.	No

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English language 3**			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	2				
SWL (hr/sem)	60				
Module Level	UGIII		**Semester of Delivery**		**Five**
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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 goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their 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	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	15	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	60		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Revision, vocabulary and comprehension
Week 2	Phrasal verbs, vocabulary and comprehension
Week 3	Academic writing (1), introduction
Week 4	English words with more than one meaning, vocabulary and comprehension
Week 5	Present tenses, vocabulary and comprehension
Week 6	Past tenses, vocabulary and comprehension
Week 7	Future tenses, vocabulary and comprehension
Week 8	Types of Essays, vocabulary and comprehension
Week 9	Punctuation, passive voice, vocabulary and comprehension
Week 10	Writing technical e-mails, vocabulary and comprehension
Week 11	Academic writing (1), writing a paragraph
Week 12	Technical English (2), keywords, vocabulary and comprehension
Week 13	Grammar revisions
Week 14	**General Revision**
Week 15	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Headway plus for intermediate	Yes
Recommended Texts	Any Grammar and comprehension for technical learning and academic writing text.	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	**Mass Transfer 2**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mass transfer 1	**Semester**	Five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	To introduce the basic principles of chemical engineering separation processes and mass transfer and then proceed to study the design and operation of separation processes units operation such as distillation, gas-liquid absorption and stripping, liquid-liquid extraction, adsorption and crystallization.
Module Learning Outcomes	Gas absorption including application, different types of equipment in industry, process design of a column to find the height and diameter of the column, required solvent flow rate. The concepts and procedure for their calculation of the number of theoretical stages, height of theoretical stages, number of theoretical and height of theoretical units will be explained. Liquid-solvent extraction when the phases are immiscible, including application, different types of equipment in industry, solvent selection, process design of a column to find the height and the diameter of the column and the required solvent flow rate. The concepts and procedure for their calculation of number of theoretical stages, height of theoretical stages, number of theoretical and height of theoretical units will be explained. Liquid-solvent extraction when the phases are miscible, including application, different types of equipment in industry, solvent selection, process design of counter-current and cross flow stage wise operations to find the number of stages to meet operation constraints.
Indicative Contents	1- Explain the physical phenomena, theoretical concepts and design aspects of mass transfer in separation processes, including distillation, gas-liquid absorption, gas-solid adsorption, liquid-liquid extraction and Drying. 2- Analyze the important separation processes of distillation, gas absorption, adsorption, liquid-liquid extraction and drying and carry out design calculations appropriately of the above processes. 3- Apply simplifying assumptions to complex problems in order to gain useful design information individually and in a team.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	106	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3,5,6,10	LO #1,2,…..10
	Assignments	2	10% (10)	7, 8	LO # 8
	Seminar	1	10% (10)	11	LO # 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	12	LO # 1-12
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
Week 1	Absorption of Gases: Introduction Two Film Theory
Week 2	Determination of transfer coefficients , number of stages in absorption column
Week 3	Design of Absorption Column using Height of Transfer Unit, Minimum Liquid Flow Rate
Week 4	Packed towers for gas absorption, plate towers for gas absorption
Week 5	Stripping: introduction
Week 6	Stripping Column, Height of Packed-bed and Number of Stages in Stripping Column
Week 7	Liquid-liquid Extraction, Ternary system of extraction,
Week 8	Extraction calculations of partial solubility and non-soluble liquids
Week 9	Design of co-current and counter-current extraction for miscible and immiscible liquids

Week 10	Drying. General principles
Week 11	Rate of drying, the mechanism of moisture movement during drying.
Week 12	Drying equipment specialised drying methods the drying of gases
Week 13	**Leaching** introduction mass transfer in leaching operations
Week 14	Countercurrent washing of solids, calculation of the number of stages
Week 15	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Recommended Texts	➢ T.K.Sherwood, R.L.Pigford and C.R.Wilke, Mass Transfer, McGrawHill, ➢ Coulson & Richardson's ,"Chemical Engineering" volume 2 , (2003) ➢ Binay K. Dutta "Principle of Mass Transfer and Separation Processes" ➢ Treybal, R.E., 'Mass Transfer Operations", 3rd edition, 1980, McGraw Hill.	No

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Reactor Design 2			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	150				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	▪ Allow students to develop knowledge, skills, and capabilities in diverse areas focusing on Chemical Engineering ▪ Enable students to develop a comprehensive understanding of the methodology of linking chemical kinetics with material and energy conservation in the design of idealized homogeneous chemical reactors and bio-reactors, operating either in batch or continuous mode, and under either isothermal or non-isothermal conditions
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students who succeeded in this course; 1. Analyze reaction systems and reactors 2. Develop creative and critical thinking skills 3. Solve open ended problems
Indicative Contents المحتويات الإرشادية	Introduction to reactor design (Definition of the Rate of Reaction, Classification of reactors). Conversion and Reactor Sizing Conservation of mass in reactors. The ideal stirred-tank reactor (Batch and steady-state flow) The ideal tubular flow reactor (PFR) Space-time and space velocity Design procedure: Batch reactor (constant volume and constant pressure) Design procedure: Continuous stirred-tank reactors (Single and multiple reactions) Design procedure: Tubular-flow reactors Comparison of stirred-tank and tubular-flow reactors. Flow recycles reactors Non-steady flow (semi-batch) reactors Energy conservation equations Batch stirred-tank reactors Continuous stirred-tank reactors Plug flow reactors in series and/or parallel Equal- size mixed flow reactors in series (first order and second order reactions) Mixed Flow Reactors of different sizes in series. Best arrangement of a set of ideal reactors

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture, Demonstration, Discussion, Question and Answer, Drill and Practice, Problem Solving.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	**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%	5,10	
	Assignments	5	10%	3,57,10,12	
	Projects / Lab.				
	Report	1	10%	1-14	
Summative assessment	**Midterm Exam**	2 hours	20%		
	Final Exam	2 house	50%		
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Thermodynamics of Chemical Reaction
Week 2	Thermodynamics of Chemical Reaction
Week 3	**Kinetics of Chemical Reaction:**
Week 4	**Kinetics of Chemical Reaction:**
Week 5	**Kinetics of Chemical Reaction:**
Week 6	**Design of Isothermal–Ideal Reactor**
Week 7	**Design of Isothermal–Ideal Reactor**
Week 8	**Design of Isothermal–Ideal Reactor**
Week 9	**Midterm**
Week 10	**Recycle reactor and Self-catalytic reactor**
Week 11	**Recycle reactor and Self-catalytic reactor**
Week 12	**Recycle reactor and Self-catalytic reactor**
Week 13	**Multiple Reactions**
Week 14	**Multiple Reactions**
Week 15	**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	1. Elements of Chemical Reaction Engineering, H. Scott Fogler, Prentice Hall, 2001	No
Recommended Texts	1. Chemical Reactor Analysis and Design, Gilbert F. Froment, Kenneth B. Bischoff, John Wiley & Sons, 1990 2. Octave Levenspiel (1999),CHEMICAL REACTOR ENGINEERING, 3rd edition, John Wiley & Sons Inc., USA ISBN: 9780471254249 3. J.M. Smith (1987), CHEMICAL ENGINEERING KINETICS, 3rd edition, McGraw-Hill International Editions, Singapore. ISBN: 9780070587106	No
Websites	http://websites.umich.edu/~elements/5e/	

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	**Gas Technology**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	**150**				
Module Level	**UGIII**		**Semester of Delivery**	**Six**	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. General look on the importance of natural gas and its reverse 2. Natural Gas, Natural Gas kinds and gas reservoir characteristics, Phase Behavior, Chemical and Physical Properties. 3. Gas Compression, Compressions of Natural Gas, Types of gas compressors: Rotary, Jet, and Reciprocating natural gas compressors. 4. Gas Physical Separation, Separators, the removal of solid, water and condensates, Stabilization process, Drying of gaseous fuel by adsorption and absorption 5. Sweetening of Gaseous fuel, Sweetening by adsorption and absorption, Gas Flaring Reduction 6. Natural Gas Liquefaction(NGL), NGL fractionation: de-ethanizer, de-propanizer, de-butanizer 7. Liquefied Petroleum Gas (LPG), LPG methods, process, and description. Some problems associated with Natural Gas treatment and production. Hydrate control in gas production causes. Occurrence and control 8. Law Temperature Separation, Methods, process, and description. 9. Gas Gathering and Transportation, Pipe Line Design Calculation and Economics, Gas flow in serious, Parallel and Looped Pipeline 10. Hydrogen production, methods, process, and description.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: **1.** Understanding the general look on the importance of natural gas and its reverse. **2.** Knowledge the Natural Gas kinds and gas reservoir characteristics, **3.** Understanding the Phase Behavior, Chemical and Physical Properties of Natural Gas. **4.** Understanding the Gas Compression, Compressions of Natural Gas, **5.** Knowledge the types of gas compressors: Rotary, Jet, and Reciprocating natural gas compressors **6.** Knowledge the Gas Physical Separation, Separators, the removal of solid, water and condensates, Stabilization process. **7.** Understanding the Drying of gaseous fuel by adsorption and absorption. **8.** Understanding the Sweetening of Gaseous fuel, Sweetening by adsorption and absorption, Gas Flaring Reduction **9.** Know the Natural Gas Liquefaction(NGL), NGL fractionation: de-ethanizer, de-propanizer, de-butanizer **10.** Understanding the Liquefied Petroleum Gas (LPG), LPG methods, process, and description. Some problems associated with Natural Gas treatment and production. **11.** Understanding the Hydrate control in gas production causes. Occurrence and control. **12.** Understanding the law Temperature Separation, Methods, process, and description. **13.** Knowledge the Gas Gathering and Transportation, Pipe Line Design Calculation and Economics, Gas flow in serious, Parallel and Looped Pipeline **14.** Understanding the Hydrogen production, methods, process, and description.
Indicative Contents المحتويات الإرشادية	• General look on the importance of natural gas and its reverse. (3hr) • Natural Gas, Natural Gas kinds and gas reservoir characteristics, Phase Behavior, Chemical and Physical Properties. (3hr) • Gas Compression, Compressions of Natural Gas, Types of gas compressors: Rotary, Jet, and Reciprocating natural gas compressors. (3hr) • Gas Physical Separation, Separators, the removal of solid, water and condensates, Stabilization process, Drying of gaseous fuel by adsorption and absorption. (6hr) • Sweetening of Gaseous fuel, Sweetening by adsorption and absorption, Gas Flaring Reduction. (3hr)

	• Natural Gas Liquefaction(NGL), NGL fractionation: de-ethanizer, de-propanizer, de-butanizer. (6hr) • Liquefied Petroleum Gas (LPG), LPG methods, process, and description. Some problems associated with Natural Gas treatment and production. Hydrate control in gas production causes. Occurrence and control. (6hr) • Law Temperature Separation, Methods, process, and description. (3hr) • Gas Gathering and Transportation, Pipe Line Design Calculation and Economics, Gas flow in serious, Parallel and Looped Pipeline. (6hr) • Hydrogen production, methods, process, and description. (3hr)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, quizzes, reports, seminars, Practical testing and Online testing.

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**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	4	10% (10)	3,6, 9,12	
	Assignments	2	10% (10)	6, 12	
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	14	
Summative assessment	Midterm Exam	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, general look on the importance of natural gas and its reverse.
Week 2	Natural Gas kinds and gas reservoir characteristics,
Week 3	Phase Behavior, Chemical and Physical Properties of Natural Gas.
Week 4	Gas Compression, Compressions of Natural Gas,
Week 5	Types of gas compressors: Rotary, Jet, and Reciprocating natural gas compressors
Week 6	Gas Physical Separation, Separators, the removal of solid, water and condensates, Stabilization process.
Week 7	Drying of gaseous fuel by adsorption and absorption.
Week 8	Sweetening of Gaseous fuel, Sweetening by adsorption and absorption, Gas Flaring Reduction
Week 9	Natural Gas Liquefaction(NGL), NGL fractionation: de-ethanizer, de-propanizer, de-butanizer
Week 10	the Liquefied Petroleum Gas (LPG), LPG methods, process, and description. Some problems associated with Natural Gas treatment and production.
Week 11	Hydrate control in gas production causes. Occurrence and control.
Week 12	Law Temperature Separation, Methods, process, and description
Week 13	Gas Gathering and Transportation, Pipe Line Design Calculation and Economics, Gas flow in serious, Parallel and Looped Pipeline
Week 14	Hydrogen production, methods, process, and description
Week 15	Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1& 2	
Week 3	
Week 4	
Week 5 & 6	
Week 7	
Week 8-9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Shreve's "Chemical Process Industries" 5th edition (2001). 2. Joseph F. Hilyard " the oil and gas industry, a nontechnical guide	yes
Recommended Texts		no
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Numerical Methods**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	**3**				
SWL (hr/sem)	**90**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**	.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	7- To define the Numerical analysis used for solving non-linear equations of unknown roots. 8- To define the Solution methods used for solving the Linear System of Equations. 9- To define the interpolation process and the interpolation methods used to compute the unknown value of the function of giving values and its applications. 10- To define the curves fitting analysis. 11- To define the numerical integration and their applications. 12- To define the numerical solution methods used for solving the partial differential Equations. 13- To define the numerical solution methods used for solving the ordinary differential Equations.
Module Learning Outcomes	Upon completion of the course, students should be able to: 1. Understand the numerical methods used for solving non-linear equations of unknown roots by applying Iteration Techniques. 2. Understand the direct and indirect Solution methods used for solving the Linear System of Equations and their applications. 3. Understand the interpolation methods used to compute the unknown value of the function of giving values and its applications. 4. Understand the curves fitting analysis by using Newton method. 5. Understand the numerical methods used for integration and their applications. 6. Understand the numerical methods used to solve the partial differential equations. 7. Understand the numerical methods used to solve the ordinary differential equations.
Indicative Contents	Indicative content includes the following. 7. Introduction of numerical solution, iteration methods of solutions, the Solution of Systems of Non-Linear Equations, and the engineering applications. [12 hrs] 8. Introduction of Linear systems of equations, direct methods, indirect methods, engineering applications) [12 hrs] 9. Introduction of Interpolation process, Newton's Divided-Difference Interpolation Polynomials, Equal Spacing, Lagrange Interpolating Polynomials. [12 hrs] 10. Introduction of Curves fitting analysis, Newton method. [6 hrs]

	11. Introduction of the Numerical integration, complex numerical integration, applications. [12 hrs] 12. Introduction of Numerical method to solve differential equations, Rang-Kotta method, Power series, exponential equations method. [18 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	45	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	45	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	90		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3,5,6,10	LO #1,2,…..10
	Assignments	2	10% (10)	7, 8	LO # 8
	Seminar	1	10% (10)	11	LO # 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	12	LO # 1-12
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
Week 1	Nonlinear equations solution, Simple Iteration.
Week 2	Newton-Raphson, finite difference methods.
Week 3	Solution of simultaneous linear equations, Direct methods
Week 4	Solution of simultaneous linear equations Indirect methods
Week 5	Interpolation by Lagrangian method.
Week 6	Interpolation by Newton method.
Week 7	Curves fitting analysis by Newton method
Week 8	Numerical integration, complex numerical integration.
Week 9	Numerical integration applications.
Week 10	Numerical method to solve partial differential equations
Week 11	Numerical method solution by separation method.
Week 12	Numerical method to solve differential equations by Rang-Kotta method
Week 13	Numerical method to solve differential equations by Power series.
Week 14	Numerical method to solve differential equations by exponential equations method
Week 15	**Preparatory week before the final Exam**

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

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	1. Numerical Methods for Scientists and Engineers, R.w. Hamming knowledge. 2. Numerical Analysis, Richard L. Burden & J. Douglas Faires. 3. Introduction to Numerical Analysis, F.B. Hildebrand.	No

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Heat Transfer 2			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Heat Transfer 1	**Semester**	Five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	20. To Analyze heat transfer by radiation using shape factors and networks. 21. To Use LMTD and NTU-Effectiveness methods to predict the size and performance of heat exchangers. 22. To Design of heat exchangers. 23. To Design heat exchanger equipment. 24. To Define and solve problems in boiling and condensation heat transfer. 25. To Design the furnace and understand the radiation heat transfer. 26. To Solve problems in heat transfer applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	12. Ability To Analyze heat transfer by radiation using shape factors and networks. 13. Ability To Use LMTD and NTU-Effectiveness methods to predict the size and performance of heat exchangers. 14. Ability To Design of heat exchangers. 15. Ability To Design heat exchanger equipment. 16. Ability To Define and solve problems in boiling and condensation heat transfer. 17. Ability To Design the furnace and understand the radiation heat transfer. 18. Ability To Solve problems in heat transfer applications
Indicative Contents المحتويات الإرشادية	Fins Fins Types, Types of Temperature distribution along fins, Annular fine calculation, application[15 hrs.] Heat exchangers Types of heat exchangers. Logarithm mean temperature difference (LMTD). Single pass and multipass heat exchangers; plate heat exchangers; heat exchangers effectiveness; Design of heat exchanger using NTU. Fouling factors and Wilson's plot. [15 hrs.] Cooling Of Electronic Equipment Manufacturing Of Electronic Equipment, The Chip Carrier [10 hrs.] Printed Circuit Boards Cooling Load Of Electronic Equipment, Conduction Cooling [12 hrs.] Conduction In Chip Carriers [12 hrs.] Conduction In Printed Circuit Boards

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 are 29. Teamwork 30. Visualization 31. Inquiry-Based Teaching 32. Student-led Classroom 33. Implementing Technology in the Classroom 34. Auditory strategies 35. Reading & Writing

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fins Definitions Types Of Fins
Week 2	Heat Transfer from Finned Surfaces Fin Equation
Week 3	Annular Fine Calculation, Application Pin Fine Calculation, Application
Week 4	Fin Efficiency Types Of Temperature Distribution Along Fins
Week 5	Heat Exchangers Definitions Types Of Heat Exchangers
Week 6	The Overall Heat Transfer Coefficient
Week 7	Fouling Factor Fouling Factors And Wilson's Plot.
Week 8	Analysis of Heat Exchangers Logarithm Mean Temperature Difference (LMTD)
Week 9	Heat Exchanger Effectiveness
Week 10	Design of Heat Exchanger Using NTU THE EFFECTIVENESS–NTU METHOD
Week 11	Selection of Heat Exchangers Heat Exchangers Design Considerations
Week 12	Cooling Of Electronic Equipment Manufacturing Of Electronic Equipment
Week 13	The Chip Carrier Printed Circuit Boards

Week 14	Cooling Load Of Electronic Equipment Conduction Cooling
Week 15	Conduction In Chip Carriers Conduction In Printed Circuit Boards
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: calculation of thermal conductivity
Week 2	Lab 2: calculation of heat transfer series wall
Week 3	Lab 3: calculation of thermal contact resistance
Week 4	Lab 4: heat transfer in very long fin
Week 5	Lab 5: estimation of heat transfer coefficient in fins
Week 6	Lab 6: steady two dimensional in plate
Week 7	Lab 7: forced convection from cylinder in cross flow

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Hollman J.P., Heat Transfer, McGraw Hill Kern D.Q., Process Heat Transfer, McGraw Hill.	yse
Recommended Texts	Heat-transfer- [YUNUS A. CENGEL]	yes
Websites	https://www.udemy.com/topic/heat-transfer/	

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.

قسم هندسة تقنيات الوقود والطاقة

المرحلة الرابعة

مسار بولونيا

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	Industrial Unit Operations		**Module Delivery**	
Module Type	C		☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code				
ECTS Credits	7			
SWL (hr/sem)	210			
Module Level	UGIV		**Semester of Delivery**	seven

Administering Department	Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	1

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**The course aims to teach the students the followings:** Boundary layer that develops in many Chemical Engineering processes such as falling film absorbers which enables the engineer to understand how the equipment works. The Momentum, heat, and mass transfer analogies to understand the similarities between these phenomena so one would be able to predict one phenomenon in terms of other measurable quantities (usually heat transfer). Introduction and applications of: Evaporation, drying (, extraction, leaching, crystallization, and adsorption. These are all separation processes that exist in the chemical industry so the student will be prepared to handle these pieces of equipment in the future.
Module Learning Outcomes	**Course Outcomes:** At the end of the course, students are able to: 1. Integrate the knowledge and understanding in designing separation columns with other unit operation. 2. Explain the theoretical basis of processes involving Humidification / dehumidification, drying, evaporation, crystallization and membrane

مخرجات التعلم للمادة الدراسية	separation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **1. Humidification and Air Conditioning (2 Weeks/ 10 hr)** Adiabatic saturation temperature. humidity data for air-water system, psychometric chart, temperature-humidity and enthalpy-humidity charts , Determination of humidity, methods of increasing humidity, Cooling towers, Design of natural-draught towers. Evaporation loss of water in cooling tower 2**. Drying (2 Weeks/ 10 hr)** Steps of drying, rate of drying, time of drying. Heat and mass transfer in dryers. Drying characteristics of materials. Solids handling, adiabatic and non-adiabatic dryers, temperature patterns in dryers, Drying equipment, design and performance of various drying equipment, Drying of petroleum gases 3. **Evaporation (2 Weeks/10 hr)** Material and energy balances in the evaporators, Types of evaporators, Single and multiple effect evaporators, Performance of evaporators. 4. **Filtration (2 Weeks/ 10 hr)** Theory and Classification of Filtration, Constant rate Filtration, Constant Pressure Filtration, Filtration equipment: Plate and frame filter press and Rotary filters 5. **Centrifugal Separation (2 Weeks/ 10 hr)** Centrifugal pressure, Separation of immiscible liquids of Different densities, Centrifugal equipment 6. **Sedimentation Separation (2 Weeks/ 10 hr)** Stokes Law, Gravitational Sedimentation, Sedimentation equipment 7. **Membranes Separation (2 Weeks/ 10 hr)** Theory and Classification of Membranes Separation, Porous membranes, pressure driven processes, Concentration or partial pressure driven processes, dense membranes, Reverse Osmosis.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture, Demonstration, Discussion, Question and Answer, Drill and Practice, Problem Solving.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	101	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	109	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	210		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15%	1-7 7-15	
	Assignments	2	15%	1-7 7-15	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1	20%		
	Final Exam	1	50%		
Total assessment					

Delivery Plan (Weekly Syllabus)المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Humidification and Air Conditioning**
Week 2	**Humidification and Air Conditioning**
Week 3	**Drying**

Week 4	**Drying**
Week 5	**Evaporation**
Week 6	**Evaporation**
Week 7	**Midterm Exam**
Week 8	**Filtration**
Week 9	**Filtration**
Week 10	**Centrifugal Separation**
Week 11	**Centrifugal Separation**
Week 12	**Sedimentation Separation**
Week 13	**Sedimentation Separation**
Week 14	**Membranes Separation**
Week 15	**Membranes Separation**
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Convection Drying
Week 2	Wet Cooling Tower
Week 3	Plate and Frame Filtration
Week 4	Rotary Drum Filtration
Week 5	Sedimentation
Week 6	Liquid - Liquid Extraction
Week 7	Fluidized bed

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

Required Texts	[1] Geankoplis C J, 1995, 'Transport Process and Unit Operations', Prentice-Hall. [2] Mc.Cabe W L, Smith J C, 1993, 'Unit Operations of Chemical Engineering', McGraw-Hill. .	no
Recommended Texts	[3] Seader & Henley, 2006, 'Separation Process Principles', John Wiley & Son. [4] Coulson J M, Richardson J F, 'Chemical Engineering Vol 2, Butterworth-Heinemann. [5] Pabby, A.K., Rizwi, S. and Sastre, A.M., 2009 Handbook of Membrane Separations	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	Design of Industrial Equipment 1			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	**6**				
SWL (hr/sem)	180				
Module Level	UGIV		**Semester of Delivery**	7	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The course content process planning, piping and pumps network, gas-gad separation, solid handling, heat and mass transfer equipment at the end of the semester, the student should be able to 1. The ability to apply the design equation and equipment specifications as practical 2. To prepare students to be able to read and understand chemical engineering plants drawing
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, Nature of design ,the organization of a chemical engineering projects Scheduling .Standards and codes. Flow sheet design, flow sheet types and designation .Block diagram .Process flow sheet .Piping and instrumentation diagram. Utilities, Computer aided drafting, process simulation programs. Layout and plot plan .Project evaluation and cost estimation [**6hr]** Valves selection. Piping design standards and codes. Pipe size selection.Mechanical design of the piping system. Pump type, pump specifications, and pump datasheet [**4hr]** Types of vessels. Criteria in vessel design, stress considerations. Materials of construction commonly used in vessel tanks. Design of tall vertical [**4hr]** Screening Classification with Streams of Air or Water Air Classifiers. Size Reduction. Equipment for Size Reduction Particle Size Enlargement Extrusion Processes [**4hr]** Heat exchanger types and applications. Basic design procedure and theory. Overall heat transfer coefficient. Heat exchanger data sheet. Furnaces convection and radiation zone. Steam boilers [**6hr]** Columns types. Plate Types. Packing types. Pressure drops in columns. Column data [**6 hr]**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture, Demonstration, Discussion, Question and Answer, Drill and Practice, Problem Solving.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	46	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	134	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	15		
	Assignments	4	15		
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1	20		
	Final Exam	1	50		
Total assessment					

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Process planning:**
Week 2	**Process planning:**
Week 3	**Piping network and Pumps**
Week 4	**Piping network and Pumps**
Week 5	**Piping network and Pumps**
Week 6	**Vessels and tanks**
Week 7	**Vessels and tanks**
Week 8	Midterm
Week 9	**Solid Handling**
Week 10	**Solid Handling**
Week 11	**Heat Transfer Equipments**
Week 12	**Heat Transfer Equipments**
Week 13	**Mass Transfer Equipments**
Week 14	**Mass Transfer Equipments**
Week 15	**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	**Sinnott R. and Towler C; 2013 " chemical Engineering Design" 5th edition Butterworth- Heinemann** **Coke,A.K ;2007"Ludwig s Applied Process Design of Chemical and petrochemical Plant" vol. 1 4th edition Gulf professional Publisher**	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Reactor Design 2			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	150				
Module Level		UGIV	**Semester of Delivery**		Seven
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Reactor 1	**Semester**	Six
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	An understanding of chemical reactions and reactors is what distinguishes chemical engineers from all other engineers – and makes us that much more valuable. As such, students in this class will need to achieve specific learning goals associated both with reaction kinetics and with reactor design
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the course, students can: 1. Express reactor design equations for plug flow, CSTR & batch reactors and determine the size of reactor required for single or multiple reactors with different arrangements. 2. Express the energy equation & evaluate the effect of heat on the rate of reaction and reactor size and identify multiple steady-state phenomena.
Indicative Contents المحتويات الإرشادية	**Catalysis and adsorption; Classification and preparation of catalysts; Promoters and inhibitors. Analysis of the reactor (solid-fluid), the height of the reactor unit, catalyst activity; Hougen Watson and power law models (10 hr)** Catalyst characterization: Surface area and pore size distribution; (10 hr) Isothermal and adiabatic fixed bed reactors; Staged adiabatic reactors; Non-isothermal non-adiabatic fixed bed reactors; Fluidized bed reactors; slurry reactors; Trickle bed reactors; Reactors with novel configurations radial flow reactors, honeycomb reactors, membrane reactors (10 hr)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture, Demonstration, Discussion, Question and Answer, Drill and Practice, Problem Solving.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	**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%	5,10	
	Assignments	5	10%	3,57,10,12	
	Projects / Lab.				
	Report	1	10%	1-14	
Summative assessment	**Midterm Exam**	2 hours	20%		
	Final Exam	2 house	50%		
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Conversion and Reactor Sizing**
Week 2	**Stoichiometry**
Week 3	**Isothermal Reactor Design**
Week 4	**Multiple Reactions**
Week 5	**Heterogeneous processes:**
Week 6	**Heterogeneous processes:**

Week 7	**Heterogeneous processes:**
Week 8	Midterm
Week 9	**Design of reactors with heterogeneous reactions**
Week 10	**Design of reactors with heterogeneous reactions**
Week 11	**Design of reactors with heterogeneous reactions**
Week 12	**Design of catalytic reactors**
Week 13	**Design of catalytic reactors**
Week 14	**Design of catalytic reactors**
Week 15	**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	1. Elements of Chemical Reaction Engineering, H. Scott Fogler, Prentice Hall, 2001	No
Recommended Texts	1. Chemical Reactor Analysis and Design, Gilbert F. Froment, Kenneth B. Bischoff, John Wiley & Sons, 1990 2. Octave Levenspiel (1999),CHEMICAL REACTOR ENGINEERING, 3rd edition, John Wiley & Sons Inc., USA ISBN: 9780471254249 3. J.M. Smith (1987), CHEMICAL ENGINEERING KINETICS, 3rd edition, McGraw-Hill International Editions, Singapore. ISBN: 9780070587106	No
Websites	http://websites.umich.edu/~elements/5e/	

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	**English language (4)**			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	2				
SWL (hr/sem)	60				
Module Level		UGIV	**Semester of Delivery**		**Seven**
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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 goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .
Indicative Contents المحتويات الإرشادية	Through the prepared syllabus, the student acquires the ability to understand grammar English language through weekly lectures and classes in a gradual and sequential manner for a period of four years, starting from the first stage, such as interrogative, negative, formation of sentences, parts of speech, and others.

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	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem)	15	**Unstructured SWL (h/w)**	1

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	60		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Grammar revision, vocabulary and comprehension
Week 2	Cause and effect clauses, State verbs, vocabulary and comprehension
Week 3	Academic writing (2), writing technical report
Week 4	Types of sentences in English (1), vocabulary and comprehension
Week 5	Types of sentences in English (2), vocabulary and comprehension
Week 6	Result clauses, vocabulary and comprehension
Week 7	conjunctions, vocabulary and comprehension
Week 8	Punctuation, vocabulary and comprehension
Week 9	Writing CV, passive voice, vocabulary and comprehension
Week 10	Technical writing, technical sentences, vocabulary and comprehension
Week 11	Writing essays, vocabulary and comprehension
Week 12	Writing summary and abstract

Week 13	Paraphrasing
Week 14	**General Revision**
Week 15	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Headway plus for post intermediate	Yes
Recommended Texts	Any Grammar and comprehension for technical learning and academic writing texts.	No
Websites		

Grading Scheme
مخطط الدرجات

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

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وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Project 1			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	150				
Module Level	UGIV		**Semester of Delivery**	Seven	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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	The design of this module is based on CDIO concept and is built upon Stage 1 (Design, Build, Test) and Stage 2 (Chemistry for Engineers) and Stage 3 (Process Design) modules. The students will require to demonstrate their ability to organise themselves in a project engineering team and to carry out a substantial Chemical Engineering process design from the preliminary stage to detailed design. To be aware of the financial, environmental and technical aspects associated with a major design project. Apply the skills acquired from all previous modules.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	➢ Translate the range of knowledge into a single practical Fuel and Energy Engineering design application. ➢ Design a chemical processing plant given the specifications. ➢ Evaluate equipment performance, environmental impact and process safety. ➢ Work effectively as part of a design team. ➢ Organising and manage a design project. ➢ Select the most appropriate process based on available data. ➢ Write a detailed design report Communicate effectively in a team.
Indicative Contents المحتويات الإرشادية	6 hour scheduled weekly for 15 weeks. Total 90 contact hours. Group centred work with one academic supervisor for each group of approximately 4-5 students. Oral presentation, Group report and Individual report. Assessment by group and individual reports. Individual mark of the group component will be based on peer review by the students and supervisor? input.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	101	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
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)	4,11	
	Assignments				
	Projects / Lab.				
	Report	1	%10 (10)		
Summative assessment	**Midterm Exam**	3 hr	%20	7	
	Final Exam	3hr	%50	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-15	Team Work (7 weeks): Process appreciation; Preliminary process flow diagrams; Initial material and energy balances; Presentation in week 5 and an initial report. Final process flow diagram and revised material and energy balances, including any revisions that may ensue from the oral presentations and/or possible plant visits. Individual Work (7 weeks): Fuel and Energy Engineering Design: Specification of all plant items including a statement of duty, a preliminary recommendation of type of equipment, an estimate of services required and materials of construction. (ii) Complete design calculations on specified items of equipment. (iii) Approximated design calculations on specified equipment items.

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		
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	Design of Industrial Equipment 2			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	At the end of the course, students are able to: 1. Synthesize a layout plan for a given process plant with all the major components. 2. Select main controlling and monitoring requirements for a given product or utility line.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	Design of distillation column, degree of freedom analysis, various design methods of the distillation column, general design consideration of multicomponent distillation, plate efficiency, tray hydraulics of sieve and valve - trays. Pressure drop in columns. Packed columns - a type of packing, packed bed height, column diameter, column internals, design methods [6 hr] Principles of separation, type of separators, vertical separators, horizontal separators, gas-liquid separator sizing, vapour handling capacity, separators without mist extractors, separators with mist extractors, liquid handling capacity [6 hr] Pumps and piping systems, pipe fittings, valves, steam traps, selection of metal type of pipes, pumps characteristics and data basis, optimum diameter, types of pumps, operating characteristics of centrifugal pumps. [6 hr] Mechanical design of process equipment, Design of thick walled, Cylindrical and

	spherical vessels under internal pressure, Design of heads and closures, Design of tall columns. Column supports & accessories. Design of flange. [6 hr] Equipment descriptions and standard notations, Process Flow diagrams, piping and instrumentation diagrams, Rules of thumb in design. Block flow diagrams, Material Balance for batch and continuous plants, Energy Balance of plants [6 hr] Piping System Design. Types of Valves, Control Valves, Safety Valves, Constructional features, Criteria for selection. [6 hr] Measuring devices of temperature, pressure, concentration and fluid flow Practical dynamic response, pressure measurement, air control value, control system for Control of heat exchanger, separation column, and reactor, Case study. [6 hr] Introduction to cost diagrams. Tutorial on lumped parameter and cost allocation diagrams. Tutorial on screening of alternatives using Cost Diagrams. Introduction to Project Economics. Project Cost estimation. Time Value of Money, Interest and Depreciation, Tutorial. Project Finance & Profitability Analysis, Tutorial. [6 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture, Demonstration, Discussion, Question and Answer, Drill and Practice, Problem Solving.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	46	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	134	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15		
	Assignments	4	15		
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	1	20		
	Final Exam	1	50		
Total assessment					

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Design of Heat Transfer Equipment
Week 2	Design of Heat Transfer Equipment
Week 3	Design of Distillation Columns
Week 4	Vessels and Tanks
Week 5	Vessels and Tanks
Week 6	Separators
Week 7	Separators
Week 8	Pumps and Compressors
Week 9	Pumps and Compressors
Week 10	Mechanical Design of equipment
Week 11	Mechanical Design of equipment
Week 12	Flow Diagrams
Week 13	Flow Diagrams

Week 14	**Piping Network**
Week 15	**Piping Network**
Week 16	**Cost**

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

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

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**اخلاقيات المهنة** (Professional Ethics)			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	**3**				
SWL (hr/sem)	**90**				
Module Level		**UGIV**	**Semester of Delivery**		**Eight**
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	* تعريف الطلبة بالخلاقيات العامة واخلاقيات المهنة الهندسية. * الارتقاء بمستوى وعي الطلبة ليتمكنوا من ادراك الابعاد الاخلاقية المحيطة بممارسة مهنهم المستقبلية. * تطوير قناعة حقيقية لدى الطلبة باهمية الالتزام الخلقي.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	المعرفة والفهم والتطبيق * شرح مبادىء التحليل الاخلاقي والتفكير في مختلف المواقف المهنية. * تنمية فرص الحوار والمناقشة حول المفاهيم الاخلاقية. * حل المشكلات الاخلاقية التي تواجه الخريج في العمل. * تنمية مهارة الحكم الاخلاقي للطلبة واستعدادهم للالتزام الاخلاقي بعد التخرج. * الارتقاء بمستوى وعي الطلبة ليتمكنوا من إدراك كافة الابعاد الاخلاقية المحيطة بممارسة مهنهم المستقبلية. * تقديم المعرفة العلمية والعملية. *اعداد خريجين مؤهلين مهنياً واخلاقياً وتمكينهم من القيام بمهام المهنة العملية بعد التخرج بجودة عالية.
Indicative Contents المحتويات الإرشادية	يتكون المقرر من مجموعة من القواعد والمبادئ السلوكية والأخلاقيّة التي يجب أن يلتزم بها اصحاب المهن الهندسية تجاه العمل والمتعاملين معهم من الزبائن والزملاء والمرؤوسين والرؤساء والمجتمع، فضلا عن ضمان حقوق الجميع ومنع الممارسات الخاطئة، واحترام حياة الانسان ورفاهيته مع مراعاة المحافظة على البيئة ومبادئ التنمية المستدامة.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	اعطاء الدروس النظرية ، تفعيل المناقشة والحوار والعصف الذهني وتمثيل الادوار، مهارات التفكير النقدي، كتابة التقارير الخاصة بالمادة العلمية، عرض التجارب المستمدة من واقع الحياة المهنية ، الامتحانات اليومية و الاسبوعية.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**45**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**3**
Unstructured SWL (h/sem)	**45**	**Unstructured SWL (h/w)**	3

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**90**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20%(20)	5 . 10	
	Assignments	2	10% (10)	3 , 9	
	Projects / Lab.		-	-	
	Report	1	10% (10)	14	
Summative assessment	**Midterm Exam**	-	-	-	
	Final Exam	3hr	60%(60)	15	
Total assessment			100%(100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	مقدمة وتعريف بالأخلاق ومنشأها ومصادرها.
Week 2	مقدمة وتعريف القيم الاخلاقية، اهمية الاخلاق للفرد والمجتمع.
Week 3	مقدمة وتعريف عن العمل و المهنة.
Week 4	اخلاقيات المهنة.
Week 5	القيم و اخلاقيات المهنة.
Week 6	القيم و اخلاقيات المهنة.
Week 7	أنماط السلوك غير الأخلاقي في المهنة (الفساد الاداري).
Week 8	أنماط السلوك غير الأخلاقي في المهنة (الرشوة والغش).
Week 9	وسائل واساليب ترسيخ قيم اخلاقيات المهنة.
Week 10	وسائل واساليب ترسيخ قيم اخلاقيات المهنة.

Week 11	اخلاقيات ممارسة المهن الهندسية.
Week 12	اخلاقيات ممارسة المهن الهندسية.
Week 13	اخلاقيات ممارسة المهن الهندسية.
Week 14	ميثاق اخلاق مهنة الهندسة لاتحاد المهندسين العرب (نموذج اخلاقيات مهنة الهندسة).
Week 15	ميثاق اخلاق مهنة الهندسة لاتحاد المهندسين العرب (نموذج اخلاقيات مهنة الهندسة).

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	• أ.د. يحيى خليف (مدخل الى اخلاقيات مهنة الهندسة)، جامعة الكلك فهد للبترول والمعادن، 2000. • د.احمد جابر حسنين (اخلاقيات العمل بين الدين والمجتمع)،2011. • اتحاد المهندسين العرب: ميثاق اخلاق مهنة الهندسة، 2018	نعم

Recommended Texts	مدونة اخلاقيات ممارسة المهنة الهندسية ، وزارة الاعمار والاسكان والبلديات والاشغال العامة، الطبعة الاولى، 2017.	نعم
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	Measurement and Control Engineering	**Module Delivery**
Module Type	C	☐ **Theory**

Module Code				☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level	UGIV	**Semester of Delivery**	Eight		
Administering Department	Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College		
Module Leader		**e-mail**			
Module Leader's Acad. Title		**Module Leader's Qualification**			
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date		**Version Number**	1		

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	**At the end of the semester the student should be able to :-** **1. To enhancement the ability of students for the analysis of closed-loop system and response of controlled system under different operating conditions.** **2. Construction of transfer function of the closed system for different schemes.** **3. Provide practice of tuning of controller parameters and limiting of stable operating conditions.**

	4. Motivation and encourage the students for solving open ended problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Course Outcomes: At the end of the course, students are able to:** **1. Analyze responses of systems with different orders.** **2. Analyze closed loop block diagrams.** **3. Design controllers for closed loop systems.** **4. Tune controllers that has been designed using various methods such as Bode stability criteria and dynamic error criteria.** **5. Analyze the stability of closed loop systems that has been designed.**
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Instrumentation: - Sensors: pressure, temperature, level, flow and concentration. Control valve. Dynamics characteristics of Instruments. (8 hr) Linear Closed-Loop Systems: - The Control System, Controllers and Final Control Elements, Block Diagram of Controlled System, Overall Closed-Loop Transfer Functions. (8 hr) Characteristics of the Closed Loop System Transient Response of Simple Control Systems, Stability (10 hr) Frequency Response Methods (10 hr) Introduction to Frequency Response Bode Diagrams, Control System Design by Frequency Response, Ziegler-Nichols Controller Settings. Computer Control of Chemical process (6hr) Analog Computer, Digital Computer, Computer Control Loops Control of Complex Processes (6hr) Distillation Column, Absorber, Chemical Reactor

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture, Demonstration, Discussion, Question and Answer, Drill and Practice, Problem Solving.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	101	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem)	79	**Unstructured SWL (h/w)**	5

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15%		
	Assignments	2	15%		
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	1	20%		
	Final Exam	1	50%		
Total assessment					

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to process control
Week 2	Linear Open-Loop Systems: Response of First-Order Systems
Week 3	Linear Open-Loop Systems: Response of First-Order Systems
Week 4	Linear Open-Loop Systems
Week 5	Linear Open-Loop Systems
Week 6	Response of First-Order Systems in Series
Week 7	Response of First-Order Systems in Series
Week 8	Higher-Order Systems: Second-Order and Transportation Lag
Week 9	Linear closed-loop systems: the control system
Week 10	Block Diagram of a Reactor Control System

Week 11	**Stability**
Week 12	**Root Locus**
Week 13	**Frequency Response**
Week 14	**Control System Design by Frequency Response**
Week 15	**Control valves**
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Flow rate Control**
Week 2	**Level Control in the Tank**
Week 3	**Pressure Control**
Week 4	**Dynamic Behavior of Second order over Damped System (Stirred Tanks)**
Week 5	**Dynamic Behavior of Second order over Damped System (Stirred Tanks Heater)**
Week 6	**Temperature Control**
Week 7	**PH Control**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. D.R. Coughanowr and S. LeBlanc, Process Systems Analysis and Control, McGraw-Hill, 3nd edition, 2008. 2. Stephanopoulos G., "Chemical Process Control-An Introduction to Theory and Practice, "Prentice -Hall, New Jersey, 1984.	
Recommended Texts	1. Luyben W. L., "Process Modeling, Simulation and Control for Chemical Engineers," McGraw-Hill, New York, 2nd Ed., 1990 .	

	2. *Process Dynamics: Modeling, Analysis and Simulation, by Wayne Bequette.*	
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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نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Corrosion			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	UGx11 UGIV		**Semester of Delivery**	Eight	
Administering Department	Fuel and Energy Technologies Engineering		College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		
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	i. Introduce basic concepts of corrosion science ii. Understand basic electrochemistry of corrosion, calculation of polarization diagrams and use of cell EMF data to predict corrosion rate. iii. Understand different types of corrosion and their mechanisms. iv. Gain knowledge of different corrosion protection strategies. v. Introduce fundamentals of design for corrosion. vi. Introduce different metals for corrosion resistance
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, the students will be able to: i. Demonstrate a basic understanding of the principles of material corrosion, corrosion thermodynamics and kinetics ii. . Calculate polarization diagrams with given corrosion data and to predict the spontaneity of corrosion reaction based on cell EMF calculations iii. Identify different forms of corrosion and their root causes in different environments (iv. Understand different corrosion protection strategies and to apply them in appropriate situations v. . Design for corrosion, based on their knowledge of types of corrosion and corrosion protection methods. vi. Demonstrate knowledge of different metal alloys and their corrosion problems and application for industry.
Indicative Contents المحتويات الإرشادية	Technical and economic aspects of corrosion problems. Electrochemical and metallurgical aspects of corrosion. Types of corrosion: pitting, crevice, intergranular, galvanic, and stress corrosion cracking. Mechanism and prevention of corrosion failures. Cathodic protection, Anodic protection, corrosion control using inhibitors, Coatings. Corrosion resistant materials. Design consideration in prevention of corrosion failures. Corrosion monitoring

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	10% (10)		
	Assignments	2	10% (10)		
	Projects	1	10% (10)		
	Report/ Lab.	10	10% (10)		
Summative assessment	**Midterm Exam**		10% (10)		
	Final Exam	4 hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: Explain of corrosion and mechanism. Measurement of corrosion
Week 2	Reactions of corrosion. Classification of corrosion.
Week 3	Corrosion cells, Standard electrodes
Week 4	Forms of corrosion
Week 5	Thermodynamic of corrosion
Week 6-7	Kinetic of Corrosion Reaction
Week 8-9	Pourbiax diagram, Evens Diagram
Week 11-10	Polarization and Overvoltage, Calculation of corrosion rate
Week 12	Passivity
Week 13	Corrosion control
Week 14	Cathodic and anodic protection
Week 15	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Safety in laboratory, laboratory tool , How to write a scientific report
Week 2,3	How to write a scientific report
Week 4,5	Calculate the corrosion rate in acidic medium by the weight loss.
Week 6-7	Calculate the corrosion rate in basic medium by the weight loss.
Week 8-9	Calculate the corrosion rate in brine medium by the weight loss.
Week 10-11	Galvanic corrosion
Week 12-13	Measure the thickness of the coating layer
Week14	Cathodic Protection
Week15	final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Mars G. Fontana, “Corrosion Engineering”, Mc Graw-Hill Materials science and engineering. 2- K. Elayaperumal and V. S. Raja, “Corrosion Failures- Theory, Case Studies, and Solutions”, John Wiley & Sons, Inc., 2015.	no
Websites	https://onlinelibrary.wiley.com/doi/10.1002/9781118232163.ch4Welcome?return=	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	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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وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Project 2			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	150				
Module Level		UGIV	**Semester of Delivery**		Eight
Administering Department		Fuel and Energy Technologies Engineering	College	Shatt Al-Arab University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Project 1	**Semester**	Seven
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 design of this module is based on Fuel and Energy design concept and is built upon Stage 1 (Design, Build, Test) and Stage 2 (Chemistry for Engineers) and Stage 3 (Process Design) modules. The students will require to demonstrate their ability to organize themselves in a project engineering team and to carry out a substantial Chemical Engineering process design from the preliminary stage to detailed design. To be aware of the financial, environmental and technical aspects associated with a major design project. Apply the skills acquired from all previous modules.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	➢ Translate the range of knowledge into a single practical Fuel and Energy Engineering design application. ➢ Design a chemical processing plant given the specifications. ➢ Evaluate equipment performance, environmental impact and process safety. ➢ Work effectively as part of a design team. ➢ Organizing and manage a design project. ➢ Select the most appropriate process based on available data. ➢ Write a detailed design report Communicate effectively in a team.
Indicative Contents المحتويات الإرشادية	6 hour scheduled weekly for 15 weeks. Total 90 contact hours. Group centred work with one academic supervisor for each group of approximately 4-5 students. Oral presentation, Group report and Individual report. Assessment by group and individual reports. Individual mark of the group component will be based on peer review by the students and supervisor.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	101	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
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)	4,11	
	Assignments				
	Projects / Lab.				
	Report	1	%10 (10)		
Summative assessment	**Midterm Exam**	3 hr	%20	7	
	Final Exam	3hr	%50	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-15	Special Task: each student will complete one special task allocated by the tutor. (a) An engineering flow diagram (3 weeks). (b) Plant layout drawings (3 weeks). (c) Capital and manufacturing cost estimates (2 weeks). (d) Plant commissioning and normal plant operation. (e) Mechanical engineering design of one plant item (3 weeks). (f) Process integration study (2 weeks). Group work on hazard and operability study (3 week): This study of a section of the plant specified by the tutor may lead to proposals for modifying the flow sheet and/or procedures for the commissioning and normal operations.

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

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