



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
College of Oil & Gas Techniques
Engineering/Kirkuk
Department of Fuel and Energy
Engineering



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Principles of Chemical Engineering		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	FEK104			
ECTS Credits	11			
SWL (hr/sem)	275			
Module Level	1	Semester of Delivery	2	
Administering Department	FEK	College	COGTEK	
Module Leader	Hayder mahmood hameed		e-mail	haydermahmood35@ntu.edu.iq
Module Leader's Acad. Title	Assistance Lecturer		Module Leader's Qualification	M.Sc.
Module Tutor			e-mail	E-mail
Peer Reviewer Name			e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. To introduce students to the basic principles and calculation techniques used in the chemical industries. 2. to acquaint them with the fundamentals of the material and energy balances as applied to chemical engineering processes. 3. To expose the students to solve the problems in material and energy balances that arise in relation to the problems involving different chemical process units. 4. To introduce them to numerical methods used to solve the problems. 5. The course will introduce simple language and ample examples so that it will encourage learners to get used to the course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Having successfully completed this module, student will be able to demonstrate knowledge and understanding of: <ul style="list-style-type: none"> • Calculating they equilibrium constant for a chemical process and describing the effect of changes in conditions (temperature pressure and composition) on the value of the equilibrium constant. • determining the order of a chemical reaction and writing expressions for the rate law, explaining the effect of temperature on the rate constant and outcome of the reaction. • Performing mass and energy balance calculations representative of chemical processes
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part 1-Introduction to Engineering Calculations</u> Definition, history and role of chemical engineers: Definition of chemical engineering, role of chemical engineers in society Basic features of chemical process: Classifications and modes of chemical processes; basic features of chemical process and unit operation Unit systems and dimensions: Dimensional homogeneity and its analysis, Analysis of problem with solution.

	<p><u>Part B- Process Variables</u></p> <p>Variables and properties of material in systems: Physical and transport properties of materials and mixtures, Analysis of problem with solution</p> <p>Pressure and temperature of flow process: Pressure and temperature and their measurements in flow process, problem solving.</p> <p>Rate of chemical processes: Flow rate and its measurements, Rate of mass transfer, Analysis of problem with solution Solving problems.</p> <p><u>Part C - Fundamentals of Material Balances</u></p> <p>Principles of material balance and its calculation: basis of engineering calculations, the general material balance equation, Balances on single and multiple unit processes without reaction, Solving problems.</p> <p>Material balances on non-reactive processes: Material balances on non-reactive processes with recycle and bypass, Solving problems.</p> <p>Material balances on reactive processes: Material balances on reactive processes, Solving problems.</p> <p>Material balances on combustion processes: Material balances based on combustion reactions, Solving problems.</p> <p><u>Part D- Gases and Vapors</u></p> <p>Ideal gases, material balances for ideal gas mixtures, Real gases Equations of state, compressibility charts, real gas mixtures.</p>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	<p>The main strategy for teaching is lectures in which the students and the lecturers share with each other information about underlying principles and concepts central to chemical engineering discipline. In addition, tutorials can offer students the opportunity to practice the analytical and theoretical skills which have been introduced in lectures, and to deal with a wide range of applications. Furthermore, assignments will be used to offer the opportunity to retrieve and self-learn materials available in sources outside the lecture classes.</p>

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	95	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	180	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	12
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	275		

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	All
	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 Engineering Calculations
Week 2	Introduction to Engineering Calculations
Week 3	Process Variables
Week 4	Process Variables
Week 5	Fundamentals of Material Balances
Week 6	Mid-term Exam
Week 7	Material Balances without Chemical Reactions
Week 8	Material Balances without Chemical Reactions

Week 9	Material Balances with Chemical Reactions
Week 10	Material Balances with Chemical Reactions
Week 11	Combustion Reactions
Week 12	Combustion Reactions
Week 13	Gases and Vapors
Week 14	Gases and Vapors
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	RM Felder, Ronald W. Rousseau, Lisa G. Bullard, Elementary principles of Chemical processes, 14th Ed., John Weily & Sons, Asia ,2017.	
Recommended Texts	D.M. Himmelblau, J. B. Riggs, Principles and calculations in chemical Engineering, 7/8th Ed., Prentice Hall of India, 2012.	
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.