نموذج وصف المادة الدراسية لمادة الكيمياء

Module Information معلومات المادة الدراسية					
Module Title	Chemistry			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	PE124				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		Semester of Delivery	2	
Administering Department	PE		College	COENG	
Module Leader	Dr. Sarmad Al-Ansari		e-mail	al-anssari@alnaji-uni.edu.iq	
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	Ph.D.	
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date			Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The primary objective of this course is to provide First-Year Petroleum Engineering students with a fundamental understanding of general and organic chemistry principles essential for the oil and gas industry. Specific objectives include:

	1. To understand the principles of stoichiometry, chemical reactions, and thermodynamics. 2. To introduce the fundamentals of Organic Chemistry, focusing on hydrocarbons (Alkanes, Alkenes, Alkynes) and petroleum composition. 3. To analyze the principles of electrochemistry and corrosion, which are critical for pipeline and equipment maintenance. 4. To study water chemistry, including treatment for domestic and industrial use. 5. To develop practical laboratory skills in titration, solution preparation, and safety protocols.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this module, students will be able to: 1. **Define** and apply the concepts of stoichiometry to calculate reactant and product masses in chemical reactions. 2. **Classify** organic compounds, specifically hydrocarbons, and understand their physical and chemical properties relevant to fuels. 3. **Explain** the mechanisms of corrosion and electrochemical cells and propose basic prevention methods. 4. **Analyze** water quality parameters and understand the environmental impact of atmospheric pollution. 5. **Conduct** laboratory experiments (such as acid-base titrations) safely and accurately report scientific data.
Indicative Contents المحتويات الإرشادية	• **General Chemistry:** Atoms, molecules, moles, stoichiometry, chemical equations, and thermochemistry. • **Organic Chemistry:** Introduction to Carbon chemistry, Alkanes, Alkenes, Alkynes, aromatic hydrocarbons, and nomenclature. • **Petroleum Chemistry:** Composition of crude oil, fractional distillation basics, and fuel properties. • **Electrochemistry:** Oxidation-reduction reactions, Galvanic cells, batteries, and the electrochemical series. • **Corrosion:** Principles of rust/corrosion, factors affecting corrosion rates in pipelines, and cathodic protection. • **Water Chemistry:** Hardness, pH, water treatment for industrial use (boiler feed water), and domestic water standards. • **Environmental Chemistry:** Atmospheric pollution, combustion products, and green chemistry principles.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• **Interactive Lectures:** Face-to-face explanations of core concepts supported by visual aids and real-world petroleum examples. • **Laboratory Practical Sessions:** Hands-on experiments to reinforce theoretical concepts (e.g., titration, identification of organic groups).

	• **Problem-Based Learning:** Solving calculation-based problems regarding stoichiometry and pH levels during tutorials. • **Technical Reports:** Students are required to document lab results, enhancing their scientific writing skills.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Introduction to Course & Safety.
Week 2	• Review of General Chemistry Concepts (Atoms, Bonding).
Week 3	• Stoichiometry: Chemical reactions and heat (Thermochemistry).
Week 4	• Introduction to Organic Chemistry (Hydrocarbons).
Week 5	• Fuels: International Energy Strategy & Petroleum composition.
Week 6	• Electrochemistry: Batteries and Electronic Cells.

Week 7	• Electrochemistry continued.
Week 8	• Midterm Review and Exa Principles of Corrosion in Petroleum Engineering.
Week 9	• Water Chemistry: Properties and Analysis.
Week 10	• Water for Domestic Uses.
Week 11	• Industrial Water Treatment
Week 12	• Petroleum Chemistry: Refining basics.
Week 13	• Environmental Impact: Atmospheric Pollution.
Week 14	• Review and Problem Solving.
Week 15	• Final Exam or Assessment

Delivery Plan for Lab (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	• Introduction to Lab Safety & Glassware.
Week 2	• Review of Chemistry Concepts (Lab tour).
Week 3	• Preparation of Standard Solutions.
Week 4	• Introduction to Titration.
Week 5	• Acid-Base Titration (Strong Acid/Strong Base).
Week 6	• Acid-Base Titration (Weak Acid/Strong Base).
Week 7	• Determination of Acidity.
Week 8	• Chemical Indicators & pH measurement.
Week 9	• Preparation of Chemical Reagents.
Week 10	• Analysis of Water Hardness.
Week 11	• Chloride Content in Water.
Week 12	• Petroleum Chemistry Tests (Density/Viscosity demo).
Week 13	• Electrochemical Cells experiment.
Week 14	• Lab Exam / Final Practical Assessment.
Week 15	• Lab Cleanup and Results finalization.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Chemistry for Engineering Students 4th Edition, 2018 Lawrence S. Brown , Tom Holme	yes

Recommended Texts	General Chemistry: The Essential Concepts 7th Edition Raymond Chang , Kenneth Goldsby	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.