



Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering
Department of Materials Engineering



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Materials Chemistry		Module Delivery
Module Type	Basic		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MATE 103		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	Semester of Delivery	
Administering Department	Materials Engineering	College	College of Engineering
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	13/06/2023	Version Number	

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



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>During the semester the students will:</p> <ol style="list-style-type: none">1. Learn an idea about the atomic structures of compounds and atomic theories.2. Learn the relationships between the structure of the atom and its properties in terms of determining the number of protons, neutrons and electrons.3. Learn and understand the basics of chemical reactions.4. Learn and understand the quantitative relationship between substances in balanced chemical equations and make equivalence calculations.5. Knowing the laws of energy conservation in chemical reaction and thermodynamics.6. Learn and understand redox reactions and electrochemistry.7. Learn and understand an introduction to analytical chemistry.8. Learn and understand organic compounds of their aliphatic and aromatic types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1. Understanding and teaching students the concepts of materials chemistry.2. Enabling students to obtain knowledge and understanding the fields of material chemistry.3. To make the student understand spatial scales, especially sizes, and according to the arrangement of atoms.4. Enabling students to obtain knowledge in molecular orbital theory.5. Enabling students to obtain knowledge and understanding the elements of the periodic table and the types of chemical bonds.6. To make the student understand the different properties of the elements in the periodic table.7. Enable students to obtain knowledge about gas laws, solve their problems, and hypotheses that explain the behaviour of gases.8. Students' understanding of energies, their types, and energy changes in chemical reactions.9. Enable students to understand thermodynamics and solve problems for the first and second laws of thermodynamics.10. Enable students to understand the standard and random free energy of molecules and solve their problems.11. Students' understanding of oxidation-reduction reactions.12. Enable students to understand the basics of analytical chemistry and prepare standard solutions of chemical compounds.13. Enable students to understand organic compounds of various kinds, as well as organometallic compounds.
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following. Atoms and Molecules (Fundamental particles, Atomic models, hydrogen spectra, Kossel theory, Born-Hyber cycle, MO theory) [6 hrs.]</p>



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	<p>Periodic tables (Octet rule, Lewis symbol, Types of chemical bonds, Properties of periodic tables: Ionization energy, electronegativity, electrophilicity, atomic radius) [7 hrs.]</p> <p>Gases (Gas pressure, The simple gas laws, Ideal gas law, Real gas law) [6 hrs.]</p> <p>Energy (Types, Energy Changes in Chemical Reactions, Enthalpy of chemical reactions) [6 hrs.]</p> <p>Thermodynamics, First law of thermodynamics, second law of thermodynamic) [8 hrs.]</p> <p>Free Energy and Chemical Equilibrium, Heterogeneous reaction, Gibbs energy, entropy) [6 hrs.]</p> <p>Redox Reactions and Electrochemistry [4 hrs.]</p> <p>Introduction of analytical chemistry [4hrs.]</p> <p>Introduction to Organic Chemistry (Aliphatic Hydrocarbons, Aromatic Hydrocarbons) [12 hrs.]</p> <p>Organometallic compounds [4 hrs.]</p>
Course Description	<p>This course provides students an idea about the chemistry of materials and the theories that explain the molecular composition of chemical compounds and the properties of elements in the periodic table, Gases and their laws are also clarified and the required problems are solved, Thermodynamics and their laws have been explained, Redox reactions and electrochemistry are also recognized, organic compounds and their interactions and applying important experiments in the chemistry laboratory.</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> 1. Providing students with the basics and additional topics related to the pre-skills education outcomes to solve practical problems. 2. Solve a set of practical examples by the academic staff. 3. Students participate during the lecture by solving some practical problems. 4. Develop students' skills through laboratory experiments approved for the curriculum
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ 15 اسبوعا

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		



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Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3, 6, 9 and 12	LO #1, 2, 4,5, 7, 8, 10 and 11
	Assignments	4	10% (10)	4 and 8	LO # 1,3, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5-10
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	Atoms and Molecules (Fundamental particles, Atomic models, hydrogen spectra, Kossel theory)
Week 2	Born-Hyber cycle, MO theory, hybridization
Week 3	Periodic tables (Octet rule, Lewis symbol, Chemical bonds, Ionization energy, electronegativity, electrophilicity, atomic radius)
Week 4	Gases (Gas pressure, The simple gas laws)
Week 5	Ideal gas law, Real gas law
Week 6	Energy (Types, Energy Changes in Chemical Reactions, Enthalpy of chemical reactions)
Week 7	Mid-term Exam -
Week 8	Thermodynamics, First law of thermodynamics, second law of thermodynamic
Week 9	Free Energy and Chemical Equilibrium, Heterogeneous reaction
Week 10	Gibbs energy, entropy
Week 11	Redox Reactions, Electrochemistry
Week 12	Introduction of analytical chemistry



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Week 13	Introduction to Organic Chemistry, Aliphatic Hydrocarbons.
Week 14	Aromatic Hydrocarbons
Week 15	Organometallic compounds
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Boiling point determination For chemical compounds
Week 2	Lab 2: Melting point determination For chemical compounds
Week 3	Lab 3: preparation of primary standard solution
Week 4	Lab 4: preparation of secondary standard solution
Week 5	Lab 5: Standardization of HCl and the determination of sodium hydroxide solution normality
Week 6	Lab6: Quantitative determination of the components of a solution composed of a mixture of sodium carbonate and sodium hydroxide
Week 7	Lab 7: Refracting titrant
Week 8	Lab 8: Titration Curves
Week 9	Lab 9: Viscosity measurement
Week 10	Lab10: Determine the relative and absolute densities of liquids using pycnometer
Week 11	Lab11: Adsorption of acetic acid with activated carbon particles
Week 12	Lab12: Determine the enthalpy of neutralization between a strong acid (HCl) and a strong base (NaOH)
Week 13	Lab13: Preparation of acetic acid
Week 14	Lab14: Detection of effective functional groups
Week 15	Lab15: Determination of water hardness

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. R. Chang, J. Over by: General chemistry: the essential	<u>Yes</u>



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	concepts, 6th ed, 2011. 2. O.V. Roussak • H.D. Gesser: Applied Chemistry A Textbook for Engineers and Technologists, 2nd ed, 2013.	
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.				