	Ministry of Higher Education and Scientific Research - Iraq Al-Mustaqbal University College for engineering and technology Department of Biomedical Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Physical Chemistry	**Module Delivery**	
Module Type	BASIC	Theory Lecture Tutorial Lab.	
Module Code	UOMU0102031		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	٢	**Semester of Delivery**	**1st Semester**
Administering Department	**Department of Chemical Engineering and Petroleum Industries**	**College**	**College of Engineering**
Module Leader	Asst.lec Zaid Ghaith Al-jebouri	**e-mail**	Zaid.ghaith.mohammed@uomus.edu.iq
Module Leader's Acad. Title	Assistant Lecture	**Module Leader's Qualification**	MSC.Petroleum engineering
Module Tutor	Asst.lec Zaid Ghaith Al-jebouri	**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ANCH112	**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	1. able to apply experimental techniques to the determination of rates law and rate constant, enzyme reactions kinetics. 2. deal with Surface chemistry: adsorption isotherms, surface tension, colloidal systems, and its properties 3. learns how to deal with applications of the equations of ideal gases for the close system with its four types of process 4. Be able to understand the relationship between electrical energy and chemical energy and their inter-conversion of one form to another and their calculation. Understand the principles governing phase diagrams and be able to interpret phase diagrams for various kinds of systems		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. Developed a solid foundation of fundamental concepts spanning physical chemistry. Developed skills draw and uses graphs/tables/etc. (oral and written) 2. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. Gained experience of good laboratory practices, essential practical techniques, and in the preparation of written reports. students get the knowledge of functioning of various instruments, electrochemical techniques. An ability to communicate effectively with a range of audiences. It enhances the student's ability to solve exercises and explain some points to others		
Indicative Contents المحتويات الإرشادية	**Chemical Kinetics:** Rate of consumption and formation, rate of reaction, empirical rate equation, order of reaction (zero, 1st, 2nd, 3ed) rate constants and rate coefficients, enzyme reactions kinetics, analysis of kinetic results. (9 h) **Surface chemistry:** Adsorption, adsorption isotherms, surface tension and capillary rise, colloidal systems, electrical properties of colloidal systems, gels, emulsions. (9 h) **Phase Equilibria:** Equilibrium between phases, one component systems, binary systems, temperature composition diagram (boiling point curves), liquid vapor equilibria of two component system, liquid vapor equilibrium in system not obeying Raoults law, distillation, azeotropes, component systems. (9 h)		

	Applications of the equations of ideal gases: The PVT behavior of pure substances, close system, isotherm process, isochoric process, isobaric process, the adiabatic process and the polytropic process. (9 h)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes interactive Lectures / Tutorial / Pictures / video clips and Laboratories' Experimenter.

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	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
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**	5	15% (3)	2,4,6,9,12	LO #1, 2
	Assignments	5	10% (2)	Continuous	LO #1, 2
	Projects / Lab.	5	5% (1)	Continuous	LO #1, 2,3
	Report	1	10% (10)	Continuous	LO #1, 2
Summative assessment	**Midterm Exam**	2hr	10% (10)	10	LO #1, 2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Rate of consumption and formation, rate of reaction
Week 2	empirical rate equation, order of reaction, First order reaction, second order
Week 3	Factors affecting reaction kinetics, activation energy.
Week 4	Adsorption, type, adsorption isotherms,
Week 5	adsorption isotherms, Surface tension and capillary rise, pressure difference across curved surface tension,
Week 6	colloidal systems, electrical properties of colloidal systems, gels, emulsions.
Week 7	The PVT behavior of pure substances, the ideal gas, close system
Week 8	the constant volume process, the constant pressure process
Week 9	the adiabatic process, the polytropic process
Week 10	Definitions, Gibbs Phase rule, One component system, Two-component systems, Constant pressure equilibria, Vapour pressure diagrams, composition of the vapour,
Week 11	Temperature composition diagrams, distillation, Azeotropes
Week 12	Immiscible liquids, Heat of transformation, Three-component phase Diagram
Week 13	Electrolytes, type, units, molar conductivity, ionic strength, determination of activity coefficient from solubility,
Week 14	the Debye-Hackle theory, Electromotive force (EMF) of a cell, measurements of EMF- the potentiometer, the polarity of electrodes, the cell reactions and reversible cells
Week 15	free energy and reversible cells, typical of half-cells classification EMF, standard electrode potentials, standard free energy and energy of aqueous ions, calculation of EMF

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Hydrolysis of H_2O_2 (kinetic)
Week 2	Saponification of acetate ethyl. (kinetic)
Week 3	Surface chemistry: Adsorption by solid from solution
Week 4	Surface chemistry: Surface tension & Viscosity.
Week 5	Three component system (water, ethanol and ethyl acetate)
Week 6	Measurement of conductivity and acidity of different electrolytes using electrodes
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	Atkins, P., de Paula, J. "Physical Chemistry"8ed edition, W. H. Freeman and Company. 2006	
Recommended Texts	1. J. Laidler, physical chemistry, Bosten; Houghton M, ffl.n company, 1999. 2. G. Mortimer, physical chemistry, San Francisco; Altarcourt science and technology company, 2000.	
Websites		

APPENDIX:

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

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي