



Course Specifications

Course Title:	Solution Chemistry and Kinetic Theory of Gases
Course Code:	4024576-2
Program:	Chemistry
Department:	Chemistry
College:	Applied Sciences
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 2
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 7 th level/4 th year
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	76 %
2	Blended	---	---
3	E-learning	√	24 %
4	Distance learning	---	---
5	Other	---	---

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	22
2	Laboratory/Studio	--
3	Tutorial	--
4	Others (E-learning + Exams+ Office hours)	12
	Total	34

B. Course Objectives and Learning Outcomes

1. Course Description The course deals with the basic principles of solution chemistry, conductivity and ionic strength of solutions as well as the basic concepts of chemistry of electrolytes and diffusion of gases.
2. Course Main Objective By the end of this course the students will be able to describe and explain: 1. Fundamental principles of solution chemistry. 2. Different types of solutions. 3. Conductivity and ionic strength of solutions. 4. Vant Hoff factor and Debye theory and movement. 5. Basic concepts of chemistry of electrolytic solutions and diffusion of gases.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Recognize the theories and concepts in solution chemistry and kinetic theory of gases.	K1
1.2	Identify the processes and chemical terminology in solution chemistry and kinetic theory of gases.	K2
1.3	Demonstrate a broad knowledge and understanding of current developments in solution chemistry and kinetic theory of gases related to environmental impact and sustainability.	K3
2	Skills :	
2.1	Apply the theories and principles, in solution chemistry and kinetic theory of gases.	S1
2.2	Solve complex problems in various contexts related to solution chemistry and kinetic theory of gases and overlapped disciplines quantitatively and qualitatively.	S2
2.3	Communicate effectively using theoretical basis of solution chemistry to a variety of audiences	S4
3	Values:	
3.1	demonstrate commitment to professional and academic values and ethics Autonomy and Responsibility.	V1
3.2	work collaboratively and constructively in teams with responsibility.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Basic concepts of solutions and colligative properties of solutions.	2+2E
2	Electrolytic solutions, Faradays law, electrochemical equivalent.	2
3	Electrical conductance applications and Kohlrausch Law.	4
4	Conductometric titrations and transport numbers, ionic migration.	4
5	Activity, activity coefficient and ionic strength	2
6	Strong electrolytes theories.	4+2E
7	Kinetic theory of gases and Collisions between gas molecules.	2+2E
8	Molecular velocities, viscosity of gases, Van der Walls Equation	2+2E
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Recognize the theories and concepts in solution chemistry and kinetic theory of gases.	Lecture E- Learning	Med-term and final Exams. Active participation of student within their group on blackboard.
1.2	Identify the processes and chemical terminology in solution chemistry and kinetic theory of gases.	Lecture	Med-term and final Exams.
1.3	Demonstrate a broad knowledge and understanding of current developments in solution chemistry and kinetic theory of gases related to environmental impact and sustainability.	Lecture	Med-term and final Exams.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills :		
2.1	Apply the theories and principles, in solution chemistry and kinetic theory of gases.	E- Learning	Assignments and activities on blackboard.
2.2	Solve complex problems in various contexts related to solution chemistry and kinetic theory of gases and overlapped disciplines quantitatively and qualitatively.	Lecture	Med-term and final Exams.
2.5	Collect a data using computers and internet to find all information related to Petrochemicals and their applications in industries	Self-Directed private Study	Assignments and activities
2.4	Communicate effectively using theoretical basis of solution chemistry to a variety of audiences	Cooperative learning and Group Presentations	Report and research on project production.
3	Values:		
3.1	demonstrate commitment to professional and academic values and ethics Autonomy and Responsibility.	Cooperative learning and Group Presentations	Report and research on project production.
3.2	work collaboratively and constructively in teams with responsibility.	Library visits	Assignments and activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and activities.	All weeks	10 %
2	E- learning.	All weeks	10 %
3	Mid-term Exam.	6	30 %
4	Final Exam.(2 hours exam)	12	50 %

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Weekly office hours for discussion with the students.
- Academic advising for students.
- Availability of Staff members to provide counseling and advice.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	<ul style="list-style-type: none"> • Physical Chemistry, Amazon logo Silbey, R. R. Alberty, M. Bawendi, 4th ed., John Wiley & Sons, 2004. • Physical Chemistry, Peter Atkins & Julio de Paula, 10th ed., W. H. Freeman and Company, 2014. • Chemistry, Raymond Chang, 10th Edition, Publisher: Thoma D. Timp, 2014.
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	<ul style="list-style-type: none"> • Solution Chemistry, P. Somasundaran and Dianzuo Wang, Mineral and Reagents, Elsevier, 2006.
Essential References Materials	<ul style="list-style-type: none"> • Kinetic Theory of Gases, Walter Kauzmann, Dover Publications, 2014.
Electronic Materials	<ul style="list-style-type: none"> • http://www.chemweb.com • http://www.sciencedirect.com • http://www.rsc.org • Websites on the internet relevant to the topics of the course
Other Learning Materials	Not required

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Well-equipped lecture halls.
Technology Resources (AV, data show, Smart Board, software, etc.)	Computer and data show.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	No other requirements.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Quality of learning resources	Students	Complete the questionnaire evaluation of the course periodically.
Effectiveness of teaching and assessment.	Program Leaders	Observation of students performing a task.
Extent of achievement of course learning outcomes.	Peer Reviewer	Checking selected exam papers, and student assignments.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Prof. Metwally Abdallah
Reference No.	
Date	

Head of Chemistry Department



Dr Moataz Morad

