



<b>Form: Course Syllabus</b>	<b>Form Number</b>	EXC-01-02-02A
	<b>Issue Number and Date</b>	2963/2022/24/3/2 5/12/2022
	<b>Number and Date of Revision or Modification</b>	2/(10/12/2023)
	<b>Deans Council Approval Decision Number</b>	50/2023
	<b>The Date of the Deans Council Approval Decision</b>	26/12/2023
	<b>Number of Pages</b>	06

1.	<b>Course Title</b>	Physical Chemistry 1 (0303241)
2.	<b>Course Number</b>	0303241
3.	<b>Credit Hours (Theory, Practical)</b>	(3,0)
	<b>Contact Hours (Theory, Practical)</b>	(3,0)
4.	<b>Prerequisites/ Corequisites</b>	0303102
5.	<b>Program Title</b>	BSc in chemistry
6.	<b>Program Code</b>	0303
7.	<b>School/ Center</b>	School of Science, The University of Jordan
8.	<b>Department</b>	Chemistry
9.	<b>Course Level</b>	<b>BSc</b>
10.	<b>Year of Study and Semester (s)</b>	2 <sup>nd</sup> year
11.	<b>Other Department(s) Involved in Teaching the Course</b>	NA
12.	<b>Main Learning Language</b>	English
13.	<b>Learning Types</b>	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online
14.	<b>Online Platforms(s)</b>	<input type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams <input type="checkbox"/> Exambuilder
15.	<b>Issuing Date</b>	-
16.	<b>Revision Date</b>	23-11-2024

**17. Course Coordinator:**

Name: Professor Ehab AlShmaileh	Contact hours: Daily 9-12.30
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**18. Other Instructors:**

NA

**19. Course Description:**

As stated in the approved study plan.

**1. The Nature of Physical Chemistry and the Kinetic Theory of Gases:**

Classical mechanical and equilibrium concepts, ideal gases and equation of state, kinetic theory of gases, molecular collisions, barometric distribution law, real gases, van der Waals equation of state (Chapter 1).

**2. The First Law of Thermodynamics:**

Equilibrium states and reversibility, energy, heat and work concepts, thermochemistry, ideal gas relationships, real gases (Chapter 2).

**3. The Second and Third Laws of Thermodynamics:**

The Carnot cycle, irreversible processes, entropy concept and entropy changes, third law of thermodynamics, equilibrium conditions, Gibbs free energy, Maxwell relations, Gibbs-Helmholtz equation (Chapter 3).

**4. Chemical Equilibrium:**

Equilibria involving ideal and non-ideal gases, solution equilibrium, heterogeneous equilibrium, tests of equilibrium, coupled reactions, temperature dependence of equilibrium constants (Chapter 4).

**5. Phases and Solutions:**

Phase recognition, vapor pressure relations, classification of phase transitions, Raoult's and Henry's laws, partial molar quantities, solution thermodynamics, colligative properties (Chapter 5).

**6. Phase Equilibria:**

Equilibria between phases, one-component systems, binary systems involving vapor, condensed binary systems, ternary systems (Chapter 6).



## 20. Program Intended Learning Outcomes:

(To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program), **the program's student outcomes must fulfill the above ABET student outcomes. You can add new outcomes for your program, but all the six ABET-outcomes must be included.**

SO-1. Problem Solving: Graduates will be able to apply mathematical and scientific knowledge to identify, formulate, and solve technical or scientific problems relevant to the discipline of chemistry.

SO-2. Design: Graduates will be able to use their understanding of chemistry concepts and principles to formulate and design systems, processes, procedures, or programs to meet desired goals and outcomes.

SO-3. Experimental Skills: Graduates will be able to design, conduct, and analyze experiments or test hypotheses, utilizing appropriate chemical techniques and scientific judgment to draw meaningful conclusions.

SO-4. Communication: Graduates will be able to communicate scientific information effectively and accurately to a range of audiences, including both technical and non-technical audiences.

SO-5. Ethics and Global Context: Graduates will understand and apply ethical and professional responsibilities in the context of the impact of technical and scientific solutions on global, economic, environmental, and societal issues.

SO-6. Teamwork: Graduates will be able to work effectively as part of a team, establishing goals, planning tasks, meeting deadlines, and analyzing risk and uncertainty in the context of chemistry-related projects and initiatives.

SO-7. Handling Chemicals: An ability to apply the proper procedures for safe handling of chemicals.

## 21. Course Intended Learning Outcomes: (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

CLO-1 To provide the students with the knowledge and capacity to nature of physical chemistry and kinetic theory of gases.

CLO-2 Outline the first, second and third laws of thermodynamic

CLO-3 Apply chemical equilibrium to chemical processes.

CLO-4 Describe phases and solutions in relation to phase equilibria.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
1	x	x	x	x	x	
2	x	x	x	x	x	
3	x	x	x	x	x	
4	x	x	x	x	x	



**22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:**

Program SOs	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)
Course CLOs							
1	x				x		
2	x				x		
3	x				x		
4	x				x		

**23. Topic Outline and Schedule:**



Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous	Evaluation Methods	Learning Resources
1	1	The nature of physical chemistry and the kinetic theory of gases	-1					Text book
2	2	The nature of physical chemistry and the kinetic theory of gases	1	Face to Face	In class	S	Quizzes + Exam	Text book
3	3	The first law of thermodynamic	2	Face to Face	In class	S	Quizzes + Exam	Text book
4	4	The first law of thermodynamic	2	Face to Face	In class	S	Quizzes + Exam	Text book
5	5	The first law of thermodynamic	2	Face to Face	In class	S	Quizzes + Exam	Text book
6	6	The second and third laws of thermodynamics	2	Face to Face	In class	S	Quizzes + Exam	Text book
7	7	The second and third laws of thermodynamics	2	Face to Face	In class	S	Quizzes + Exam	Text book
8	8	The second and third laws of thermodynamics	2	Face to Face	In class	S	Quizzes + Exam	Text book
9	9	The second and third laws of thermodynamics	2	Face to Face	In class	S	Quizzes + Exam	Text book
10	10	Chemical equilibrium	3	Face to Face	In class	S	Quizzes + Exam	Text book



11	11	Chemical equilibrium	3	Face to Face	In class	S	Quizzes + Exam	Text book
12	12	Phases and solution	4	Face to Face	In class	S	Quizzes + Exam	Text book
13	13	Phases and solution	4	Face to Face	In class	S	Quizzes + Exam	Text book
14	14	Phase equilibria	4	Face to Face	In class	S	Quizzes + Exam	Text book

#### 24. Evaluation Methods:

Opportunities to demonstrate achievement of the CLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLOs	Period (Week)	Platform
Quizzes	20	All	1-4	4, 12	Face to Face
Mid	30	All	1,2	8	Face to Face
Final	50	All	1,2,3,4	16	Face to Face

#### 25. Course Requirements:

(e.g.: students should have a computer, internet connection, webcam, account on a specific software/platform...etc.): A previous knowledge of arithmetic/mathematical skills is needed as well as how to use the scientific calculator.



## 26. Course Policies:

### A. Attendance policies:

Students should attend at least 85% of the total number of lectures.

### B- Absences from exams and submitting assignments on time:

Students who miss an exam must submit an acceptable excuse and then a makeup exam will be appointed.

### C- Health and safety procedures:

Strictly according to university regulations.

### D- Honesty policy regarding cheating, plagiarism, misbehavior:

Followed according to university regulations.

### E- Grading policy:

1. Mid exam 30%
2. Semester/Lab work 20%
3. Final exam: 50%

The letter grade scale is adopted.

### F- Available university services that support achievement in the course:

## 27. References:

Required book (s), assigned reading and audio-visuals: Physical Chemistry, 4<sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)

### B- Recommended books, materials, and media:

“Physical Chemistry,” 3<sup>rd</sup> Edition by R. J. Silby and R. A. Alberty, John Wiley Sons, New York, New York (2000).

“Physical Chemistry: a modern introduction,” by C. E. Dykstra, Prentice-Hall Publishers, Upper Saddle River (1997).

“Physical Chemistry,” 6<sup>th</sup> Edition by G. M. Barrow, McGraw-Hill, Boston, Massachusetts (1996).

“The Elements of Physical Chemistry,” 2<sup>nd</sup> Edition by P. W. Atkins, Oxford University Press, London, United Kingdom (1996).

“Physical Chemistry,” 4<sup>th</sup> Edition by I. N. Levine, McGraw-Hill, New York, New York (1995).

## 28. Additional information:

This course is required by all chemistry and chemical engineering students at the University of Jordan.



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Name of the Instructor or the Course Coordinator: **Dr. Ehab AlShamaileh, Prof.**      Signature:      Date: 23-11-2024

Name of the Head of Quality Assurance  
Committee/ Department      Signature:      Date:  
**Dr., Prof.**



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Name of the Head of Department

**Dr. Murad A. AlDamen, Prof.**

Signature:

Date:

Name of the Head of Quality Assurance  
Committee/ School or Center

Signature:

Date:

Name of the Dean or the Director

**Dr. Mahmoud Jaghoub, Prof.**

Signature:

Date: