

## Course E-Syllabus

1	<b>Course title</b>	Physical Chemistry 1
2	<b>Course number</b>	0303241
3	<b>Credit hours</b>	3
	<b>Contact hours (theory, practical)</b>	(3, 0)
4	<b>Prerequisites/corequisites</b>	
5	<b>Program title</b>	Chemistry
6	<b>Program code</b>	3
7	<b>Awarding institution</b>	The University of Jordan
8	<b>School</b>	School of Science
9	<b>Department</b>	Department of Chemistry
10	<b>Level of course</b>	Second year
11	<b>Year of study and semester (s)</b>	2020/2021 First
12	<b>Final Qualification</b>	Bachelor's Degree
13	<b>Other department (s) involved in teaching the course</b>	No departments are involved in teaching the course
14	<b>Language of Instruction</b>	English
15	<b>Teaching methodology</b>	<input type="checkbox"/> Blended <input checked="" type="checkbox"/> Online
16	<b>Electronic platform(s)</b>	<input type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input checked="" type="checkbox"/> Others...by Gmail: chemiaphysical2020@gmail.com
17	<b>Date of production/revision</b>	2 <sup>nd</sup> Semester 2019/2020

### 18 Course Coordinator:

Name: **Prof. Ehab M. AlShamaileh**  
Office number: + 962 6 535 5000 ext. 22141  
Email: ehab@ju.edu.jo

### 19 Other instructors:

Name: Prof. Ehab M. AlShamaileh  
Office number: + 962 6 535 5000 ext. 22141  
Email: ehab@ju.edu.jo

## 20 Course Description:

The course covers the key concepts of three of the principal topics in first-year undergraduate physical chemistry: thermodynamics, kinetics and quantum mechanics. These three topics cover whether or not reactions occur, how fast they go and what is actually going on at the sub atomic scale.

## 21 Course aims and outcomes:

### A- Aims:

1. Develop a comprehensive understanding of the fundamental principles of physical chemistry.
2. Explain the fundamental principles of physical chemistry and their applications in Thermodynamics laws, Chemical Equilibrium, Phases and Solutions and Phase Equilibria.
3. Promote problem-solving skills by expressing important relationships in mathematical terms, and in applying mathematical techniques to the solution of relevant problems in the above fields.
4. Integrate the fundamental subjects learned with practical applications.

### B- Intended Learning Outcomes (ILOs):

Upon successful completion of this course, students will be able to:

- 1.

## 22. Topic Outline and Schedule:

Week	Lecture	Topic	Teaching Methods*/platform	Evaluation Methods**	References
1	1.1	Introduction to Physical Chemistry	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	1.2	Introduction to Physical Chemistry	Synchronous lecturing/meeting	Homework	
	1.3	Introduction to Physical Chemistry	Synchronous lecturing/meeting	Quiz	
2	2.1	The Nature of Physical Chemistry	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	2.2	The Nature of Physical Chemistry	Synchronous lecturing/meeting	Homework	
	2.3	The Kinetic Theory of Gases	Synchronous lecturing/meeting	Quiz	
3	3.1	The Kinetic Theory of Gases	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	3.2	The First Law of Thermodynamics	Synchronous lecturing/meeting	Homework	
	3.3	The First Law of Thermodynamics	Synchronous lecturing/meeting	Quiz	
4	4.1	Equilibrium states and reversibility,	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	4.2	Equilibrium states and reversibility,	Synchronous lecturing/meeting	Homework	
	4.3	energy,	Synchronous lecturing/meeting	Quiz	
5	5.1	heat and work concepts	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	5.2	The Second and Third Laws of Thermodynamics	Synchronous lecturing/meeting	Homework	
	5.3	The Second and Third Laws of Thermodynamics	Synchronous lecturing/meeting	Quiz	
6	6.1	The Carnot cycle,	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	6.2	The Carnot cycle,	Synchronous lecturing/meeting	Homework	
	6.3	irreversible processes,	Synchronous lecturing/meeting	Quiz	

7	7.1	entropy concept and entropy changes	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	7.2	entropy concept and entropy changes	Synchronous lecturing/meeting	Homework	
	7.3	third law of thermodynamics	Synchronous lecturing/meeting	Quiz	
8	8.1	third law of thermodynamics	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	8.2	equilibrium conditions, Gibbs free energy,	Synchronous lecturing/meeting	Homework	
	8.3	Mid Exam			
9	9.1	Maxwell relations, Gibbs-Helmholtz equation	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	9.2	Maxwell relations, Gibbs-Helmholtz equation	Synchronous lecturing/meeting	Homework	
	9.3	Chemical Equilibrium,	Synchronous lecturing/meeting	Quiz	
10	10.1	Chemical Equilibrium,	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	10.2	Equilibria involving ideal and non-ideal gases,	Synchronous lecturing/meeting	Homework	
	10.3	solution equilibrium,	Synchronous lecturing/meeting	Quiz	
11	11.1	heterogeneous equilibrium, tests of equilibrium,	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	11.2	temperature dependence of equilibrium constants	Synchronous lecturing/meeting	Homework	
	11.3	Phases and Solutions	Synchronous lecturing/meeting	Quiz	
12	12.1	Phase recognition, vapor pressure relations,	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	12.2	classification of phase transitions	Synchronous lecturing/meeting	Homework	
	12.3	Raoult's and Henry's laws, partial molar quantities,	Synchronous lecturing/meeting	Quiz	
13	13.1	solution thermodynamics, colligative properties	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser

	13.2	Phase Equilibria	Synchronous lecturing/meeting	Homework	and Sanctuary, Houghton Mifflin, Boston (2003)
	13.3	Phase Equilibria	Synchronous lecturing/meeting	Quiz	
14	14.1	Equilibria between phases, one-component systems	Synchronous lecturing/meeting	Homework	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	14.2	binary systems involving vapor,	Synchronous lecturing/meeting	Homework	
	14.3	condensed binary systems ternary systems	Synchronous lecturing/meeting	Quiz	
15	15.1	Solving problems from the text book	Synchronous lecturing/meeting	-	Physical Chemistry, 4 <sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)
	15.2	Solving problems from the text book	Synchronous lecturing/meeting	-	
	15.3	Solving problems from the text book	Synchronous lecturing/meeting	-	

- Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
- Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz...etc

### 23 Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	Period (Week)	Platform
Quizzes	10	All topics	Through semester	Lmsystem, Microsoft forms
Homework	10	All topics	Through semester	Lmsystem, Microsoft forms
Mid Exam	30	All topics	8	Lmsystem, Microsoft forms
Final Exam	50	All topics	16	In-Class

### 24 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform...etc):

Students should have:  
Computer, Internet connection and account on Microsoft Teams.

### 25 Course Policies:

A- Attendance policies:

- Students are expected to attend 100% of their lessons.
- Excused Absences are only allowed.
- Absence without explanation is subjected to university regulation.

B- Absences from exams and submitting assignments on time:

- Absences without written explanation are considered unexcused and subjected to university regulation.
- Late assignments submission are not allowed.

C- Health and safety procedures:

- Students and instructors are subjected to the general health and safety conditions applicable at the university, under penalty of responsibility.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

- Cheating is not allowed and penalty is set out in university regulation.

E- Grading policy:

- 10% Quizzes
- 10% Homework,
- 30% Mid Exam,
- 50% Final Exam

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

N/A

## 26 References:

A- Required book(s), assigned reading and audio-visuals:

Text book: Physical Chemistry, 4<sup>th</sup> edition, by Laidler, Meiser and Sanctuary, Houghton Mifflin, Boston (2003)

B- Recommended books, materials and media:

1. "Physical Chemistry," 3<sup>rd</sup> Edition by R. J. Silby and R. A. Alberty, John Wiley Sons, New York, New York (2000).
2. "Physical Chemistry: a modern introduction," by C. E. Dykstra, Prentice-Hall Publishers, Upper Saddle River (1997).
3. "Physical Chemistry," 6<sup>th</sup> Edition by G. M. Barrow, Mcgraw-Hill, Boston, Massachusetts (1996).
4. "The Elements of Physical Chemistry," 2<sup>nd</sup> Edition by P. W. Atkins, Oxford University Press, London, United Kingdom (1996).
5. "Physical Chemistry," 4<sup>th</sup> Edition by I. N. Levine, McGraw-Hill, New York, New York (1995).
6. "Physical Chemistry," 5<sup>th</sup> Edition by P. W. Atkins, Oxford University Press, London, United Kingdom (1994).

<p>7. "Physical Chemistry," by G. K. Vemulapalli, Prentice-Hall Publishers, Englewood Cliffs, New Jersey (1993).</p> <p>8. "A Textbook of Physical Chemistry," by K. K. Sharma and L. K. Sharma, Vani Educational Books, New Delhi, India (1986).</p> <p>9. "Principles of Physical Chemistry with Applications to the Biological Sciences," by D. Freifelder, Jones and Bartlett Publishers, Boston, Massachusetts (1985).</p> <p>10. "Physical Chemistry," 2nd Edition by J. P. Bromberg, Allyn and Bacon, Boston, Massachusetts (1984).</p> <p>11. "Physical Chemistry," by B. D. Khosla, R. Chard, New Delhi, India (1983).</p> <p>12. "Physical Chemistry," by W. J. Moore, Prentice-Hall Publishers, Englewood Cliffs, New Jersey (1972).</p>
---

**27 Additional information:**

N/A
-----

Name of Course Coordinator: Prof. Ehab AlShamaileh

Signature: *Ehab AlShamaileh*  
Date: 25/10/2020

Head of Curriculum Committee/Department: -----

Signature: -----

Head of Department: -----

Signature: -----

Head of Curriculum Committee/Faculty: -----

Signature: -----

Dean: -----

Signature: -----