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

1.	Course Title	Advanced Physical Chemistry
2.	Course Number	0303994
3.	Credit Hours (Theory, Practical)	(3,0)
	Contact Hours (Theory, Practical)	(3,0)
4.	Prerequisites/ Corequisites	-
5.	Program Title	Doctor of Philosophy (PhD) in Chemistry
6.	Program Code	0303
7.	School/ Center	The University of Jordan
8.	Department	Science
9.	Course Level	Chemistry
10.	Year of Study and Semester (s)	PhD
11.	Other Department(s) Involved in Teaching the Course	Any
12.	Main Learning Language	-
13.	Learning Types	☐Face to face learning ☒Blended ☐Fully online
14.	Online Platforms(s)	☐Moodle ☐Microsoft Teams
15.	Issuing Date	10 October 2024
16.	Revision Date	16 November 2024

17. Course Coordinator:

Name: Prof. Ehab AlShamaileh Contact hours: 24/7
Office number: CHEM-024 Phone number: 22141
Email: ehab@ju.edu.jo

18. Other Instructors:

None

19. Course Description:

This course consists of two modules that possibly can be expanded to more topics in the advances in physical chemistry:

1. Surface Chemistry
   This module will cover the most recent advances in surface chemistry in relation to thermodynamics, kinetics, adsorption and spectroscopy. Topics include the structure of solid surfaces, adsorption, isotherms, high vacuum techniques, surface analysis, surface sensitivity & surface specificity, Auger electron spectroscopy, photoelectron spectroscopy, vibrational spectroscopy, ion mass spectrometry, temperature-programmed techniques, surface diffraction, surface imaging and profiling.
2. Nanochemistry
   This module will cover the fundamentals of nanomaterials formation, nanochemistry basics, layer-by-layer self-asembly, nanocluster self-assembly, self-assembling block copolymers, self-assembly of large building blocks, nanochemistry and nanolabs, properties and applications of nanomaterials, scanning probe microscopy techniques.

20. Program Student Outcomes (SO's): (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

SO1. Develop chemistry expertise, focus on theory and practice, and contribute to advancing knowledge in a specific research field.
SO2. Conduct original, high-quality research that advances knowledge in chemistry by developing complex projects using innovative methodologies.
SO3. Mentor junior researchers and students and demonstrate leadership in the scientific community through collaboration, peer review, and knowledge exchange.
SO4. Recognize the ethical implications and responsibly use chemistry solutions to tackle global challenges.
SO5. Participate in ongoing professional development to stay up to date with the latest research and innovations.

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

CLO-1. Acquire fundamental conceptual way of thinking related to surface chemistry.
CLO-2. Apply problem solving skills to solve surface chemistry problems.
CLO-3. Gain analyzing experience for different characterization techniques.

Course ILOs	**The learning levels to be achieved**					
	Remembering	**Understanding**	**Applying**	**Analysing**	**evaluating**	**Creating**

1	✓	✓		✓		
2	✓	✓		✓		
3	✓	✓	✓	✓	✓	

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

~~Program SOs~~ / ~~Course CLOs~~	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)
1	✓				✓
2	✓				✓
3	✓				✓

23. Topic Outline and Schedule: The following topics are according to module 1.

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	1	Chapter 1 STRUCTURE OF SOLID SURFACES	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
2	2	Chapter 1 STRUCTURE OF SOLID SURFACES	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
3	3	Chapter 2 ADSORPTION OF MOLECULES ON SURFACES	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
4	4	Chapter 2	1,2,3	Blended	Class/MS	Syn	Written Exams	Notes in Surface

		ADSORPTION OF MOLECULES ON SURFACES			Teams			Chemistry
5	5	Chapter 3 THE LANGMUIR ISOTHERM	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
6	6	Chapter 3 THE LANGMUIR ISOTHERM	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
7	7	Chapter 4 UHV & EFFECTS OF GAS PRESSURE	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
8	8	Chapter 4 UHV & EFFECTS OF GAS PRESSURE	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
9	9	Chapter 5 SURFACE ANALYTICAL TECHNIQUES	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
10	10	Chapter 5 SURFACE ANALYTICAL TECHNIQUES	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
11	11	Chapter 6 OVERLAYER STRUCTURES & SURFACE DIFFRACTION	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
12	12	Chapter 6 OVERLAYER STRUCTURES & SURFACE DIFFRACTION	1,2,3	Blended	Class/MS Teams	Syn	Written Exams	Notes in Surface Chemistry
13	13	Chapter 7 SURFACE IMAGING & DEPTH PROFILING	1,2,3	Blended	Class/MS Teams		Written Exams	Notes in Surface Chemistry
14	14	Chapter 7 SURFACE	1,2,3	Blended	Class/MS Teams		Written Exams	Notes in Surface Chemistry

		IMAGING & DEPTH PROFILING						

24. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Midterm Exam	30	Chapters 1-4	CLO-1 + CLO-2 + CLO-3	9 th Week	Written exam
Project	30	Review paper	CLO-1 + CLO-2 + CLO-3	12th Week	Electronic
Final exam	40	All chapters	CLO-1 + CLO-2 + CLO-3	15-16th Week	Written exam

25. Course Requirements:

Students should have a computer, internet connection, webcam, and an account on MS Teams.

26. Course Policies:

A- Attendance policies: All students are expected to follow the of attendance policies of the University of Jordan, absences exceeding 20% of total number of class meeting (three 3-hour classes) will result in F grade or course drop.
B- Absences from exams and submitting assignments on time: University rules and regulations regarding make-up exams.
C- Health and safety procedures: NA
D- Honesty policy regarding cheating, plagiarism, misbehavior: NA
E- Grading policy: University rules and regulations
F- Available university services that support achievement in the course: NA

27. References:

A- Required book(s), assigned reading and audio-visuals: Notes in Surface Chemistry.

B- Recommended books, materials, and media: Any surface science reference.

28. Additional information:

None

Name of the Instructor or the Course Coordinator: **Prof. Dr. Ehab AlShamaileh**	Signature: *Ehab AlShamaileh*	Date: 16 Nov. 2024
The Head of Graduate Studies Committee/ Department Chemistry **Dr. Murad AlDamen, Prof.**	**Signature:** **……...……**	**Date:** **……..……**
The Head of Department of Chemistry **Dr. Murad AlDamen, Prof.**	**Signature:** **……...……**	**Date:** **……..……**
Vice Dean for Graduate Studies and Scientific Research / School of Science **Dr. Kamal Sweidan, Prof.**	**Signature:** **……...……**	**Date:** **……..……**
The Dean of School of Science **Dr. Mahmoud I. Jaghoub, Prof.**	**Signature:** **……...……**	**Date:** **……..……**