Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	06

1.	Course Title	Colloid and Surface Chemistry
2.	Course Number	303745
3.	Credit Hours (Theory, Practical)	3
	Contact Hours (Theory, Practical)	3 (theory)
4.	Prerequisites/ Corequisites	-
5.	Program Title	Master Chemistry
6.	Program Code	N/A
7.	School/ Center	N/A
8.	Department	Chemistry
9.	Course Level	Master
10.	Year of Study and Semester (s)	2-3
11.	Other Department(s) Involved in Teaching the Course	------
12.	Main Learning Language	English
13.	Learning Types	☐Face to face learning ☐Blended ☒Fully online
14.	Online Platforms(s)	☐Moodle ☐Microsoft Teams
15.	Issuing Date	Nov 2024
16.	Revision Date	Nov 2024

17. Course Coordinator:

Name Abeer Al Bawab: Contact hours: Monday/Wed. 10-12

Office number: CM 101 Phone number: 0796661601

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18. Other Instructors:

Name: Prof Fadwa Odeh

Office number:

Phone number:

Email: Odeh@ju.edu.jo

Contact hours:

19. Course Description:

As stated in the approved study plan.

Introduction to colloid and surface chemistry; system stability; instruments used in colloid and surface chemistry; sedimentation and diffusion; viscosity; surface tension; and light scattering; colloidal structure in surfactant solution; emulsions and microemulsions and their applications.

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)

Students Learning Outcomes (SLOs):

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.

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

1. Understanding the concept of colloid science and describing and differentiating between lyophilic and lyophobic colloids.

2. Apply various methods to characterize colloidal dispersions and determine particle size.

3. Analyze microscopic colloidal behavior, including Brownian motion and coagulation.

4. Understand the rheological behavior of colloidal systems and the factors affecting viscosity.

5. Explain the forces involved in colloidal stability and their role in different types of colloidal systems.

6. Derive and apply the concepts of surface tension, Laplace pressure, and surface energy.

7. Apply basic surface thermodynamics to understand adsorption and surfactant behavior.

8. Analyze the thermodynamics of surfactant self-assembly and describe self-assembled structures.

9. Evaluate the conditions required for emulsion and microemulsion formation and their applications.

10. Explain the historical development of van der Waals forces and DLVO and their role in colloid stability.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
1		✓				
2			✓			
3				✓		
4		✓				
5						
6					✓	
7			✓			
8				✓		

9					✓	
10				✓		

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

Program SO's / Course CLO's	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)
CLO (1)	✓					
CLO (2)		✓				
CLO (3)			✓			
CLO (4)				✓		
CLO (5)					✓	
CLO (6)						
CLO (7)						✓
CLO (8)	✓					
CLO (9)	✓					
CLO (10)		✓				

23. Topic Outline and Schedule:

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Nature of colloidal state	CLO-1	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
	1.2	Types of colloidal systems	CLO-1	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Pashley and Hunter
	1.3	The link between colloids and surfaces	CLO-1	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Pashley and Hunter
2	2.1	Lyophilic & lyophobic colloids	CLO-1	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	2.2	The force involved in colloidal stability	CLO-2	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	2.3	Preparation of special colloidal suspensions	CLO-2	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
Week	**Lecture**	**Topic**	**Student Learning Outcome**	**Learning Methods (Face to Face/Blended/ Fully Online)**	**Platform**	**Synchronous / Asynchronous Lecturing**	**Evaluation Methods**	**Resources**
3	3.1	Biological and technological significance of colloids	CLO-2	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	3.2	Purification procedures	CLO-2	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	3.3	Maintaining clean surfaces	CLO-2	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		& Wetting properties and their industrial importance						and Hunter
4	4.1	Brownian motion and diffusion	CLO-3	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	4.2	**Determination** of Particle Size	CLO-4	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	4.3	Microscopy & **Sedimentation** methods	CLO-4	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
5	5.1	Electrical pulse counting Light scattering methods	CLO-3	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	5.2	**Coagulation** and flocculation-stability and instability	CLO-3	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	5.3	Effect of polymer on colloid stability	CLO-3	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
6	6.1	**Introduction to**	CLO-8	**Face to Face**	Power point + VLC	NA	Attendance + HW +	Textbook by Pashley

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		surfactants & Common properties of surfactant solutions					Quizzes + Exam	and Hunter
	6.2	Thermodynamics of surfactant self-assembly	CLO-8	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	6.3	-Self-assembled surfactant structures -Surfactants and detergency	CLO-8	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
7	7.1	The conditions required to form emulsions and Microemulsions	CLO-9	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	7.2	Emulsion **polymerization** and the production of latex paints	CLO-9	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	7.3	**Photographic** emulsions & -Emulsions in food science	CLO-9	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashly and Hunter
8	8.1	Flow Behavior &	CLO-5	**Face to Face**	Power point + VLC	NA	Attendance + HW +	Textbook by Pashley

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		Definitions of rheological quantities & Viscosity/ elasticity/ Deformation / shear stress / shear rate					Quizzes + Exam	and Hunter
	8.2	Parameters which change the viscosity; Temperature / shear rate/ time/ pressure	CLO-5	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	8.3	Newtonian and Non-Newtonian flow behavior	CLO-5	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
9	9.1	Surface Tension and Wetting	CLO-6	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	9.2	The equivalence of the force and energy description of surface tension and surface energy	CLO-6	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	9.3	Derivation of the	CLO-6	**Face to Face**	Power point + VLC	NA	Attendance + HW +	Textbook by Pashley

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		Laplace pressure					Quizzes + Exam	and Hunter
10	10.1	Methods for determining the surface tension of liquids Capi llary rise and the free energy analysis	CLO-6	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	10.2	The Kelvin equation	CLO-6	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	10.3	The surface energy and cohesion of solids & The contact angle	CLO-6	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
Week	**Lecture**	**Topic**	**Student Learning Outcome**	**Learning Methods (Face to Face/Blended/ Fully Online)**	**Platform**	**Synchronous / Asynchronous Lecturing**	**Evaluation Methods**	**Resources**
11	11.1	Thermody namics of adsorption	CLO-7	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	11.2	Basic surface thermodyna mics	CLO-7	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	11.3	Derivation of the Gibbs adsorption isotherm	CLO-7	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
12	12.1	Students presentation		**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	12.2			**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	12.3			**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
13	13.1			**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	13.2			**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	13.3			**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
14	14.1	Historical devlopment of van der Waals forces and the Lennard-Jones potential	CLO-10	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	14.2	Historical developmen t of van der Waals	CLO-10	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		forces and the Lennard-Jones potential (2)						and Hunter
	14.3	Van der Waals Forces and Colloid Stability		**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
15	15.1	Van der Waals forces between macroscopic bodies	CLO-10	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	15.2	Flocculation	CLO-10	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter
	15.3	The DLVO theory colloid stability	CLO-10	**Face to Face**	Power point + VLC	NA	Attendance + HW + Quizzes + Exam	Textbook by Pashley and Hunter

24. Evaluation Methods:

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

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

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Homework	20	All	All	2 + 7 + 13	Face to Face
Presentation	10	All	All	Week 10	Face to Face

Mid	30	Half materials	Half	7	Face to Face
Final	40	All	All	15	Face to Face

25. Course Requirements:

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

in A number of specific lectures and topics computer and internet connection are requested

26. Course Policies:

(each item is applied according to the university rules)

A- Attendance policies: Regular attendance is essential for satisfactory completion of this course only percent of 20% lectures' absence is allowed from face-to-face lectures.

B- Absences from exams are allowed but with excesses and submitting assignments should be on time: (Instructors must offer reasonable assistance in making up missed work in case the student has reasonable excuse)

C- Health and safety procedures: NA

D- Honesty policy regarding cheating, plagiarism, misbehavior: Students are always advised to follow the instructions of the lectures and the exam.

E- Grading policy: personally (Grade System by Prof.)

F- Available university services that support achievement in the course: Data Show and smart boards

27. References:

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

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

Textbook: 1) Principles of colloid and surface chemistry by Pashley

2) Fundamentals of colloid and surface chemistry by Hunter

Videos and audio from the instructor and from outside resources. Available and changeable with time (requested from students to search)

28. Additional information:

Name of the Instructor or the Course Coordinator: Prof Abeer Al Bawab	Signature: 	Date: Nov /1/ 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:** ……..……