The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

1	Course title	Physicochemical Principles of Pharmacy.
2	Course number	1202134
3	**Credit hours (theory, practical)**	2 (theory)
	Contact hours (theory, practical)	2 (theory)
4	Prerequisites/corequisites	Prerequisite: 0303101 (General Chemistry I)
5	Program title	BSc in Pharmacy and PharmD
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Pharmacy
9	Department	Pharmaceutics and Pharmaceutical Technology
10	Level of course	Undergraduate
11	Year of study and semester (s)	Second semester of the 1st year
12	Final Qualification	BSc in Pharmacy or PharmD
13	Other department (s) involved in teaching the course	N/A
14	Language of Instruction	English
15	Teaching methodology	☐Blended ☒ Online
16	Electronic platform(s)	☒ Moodle ☒ Microsoft Teams ☐Skype ☐Zoom ☐Others……
17	Date of production/revision	18 February 2021

18. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.
Dr. Dina El-Sabawi
Office No.: 239
E-mail: d.sabawi@ju.edu.jo

19. Course instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Lorina Bisharat
Office 110
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Dr. Mais Saleh
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E- mail:Mais.Saleh@ju.edu.jo

20. Course Description:

The course will cover types of intermolecular forces, different states of matter and their related properties, phase equilibria and phase rule of liquid-liquid binary and ternary mixtures, physical properties of drug molecules including polarization, dielectric constant and refractive index, solutions of nonelectrolytes; including concentration expressions and colligative properties; solutions of electrolytes including electrical conductance, equivalent conductance, colligative properties of electrolytes and Arrhenius theory of electrolytic dissociation and solubility and distribution.

21. Course aims and outcomes:

A- Aims:

This module aims to provide the students with an understanding of the physicochemical principles that influence the formulation and stability of drug delivery systems, some mathematical, critical thinking and problem-solving skills needed throughout the program and necessary to interpret and understand scientific concepts.

B- Course Intended Learning Outcomes (ILOs):
Upon successful completion of this course students will be able to:

• Develop, integrate, and apply knowledge from the foundational sciences in Clinical sciences (learner)

1. Recall information regarding selected physicochemical concepts, such as intermolecular forces, states of matter and properties of drug molecules and solutions.
2. Explain principles of intermolecular forces, states of matter, phase equilibria and phase rule, physical properties of drug molecules, solutions of nonelectrolytes and electrolytes and their colligative properties and concept of solubility.
3. Describe physiochemical properties of drug substances.
4. Relate basic properties and concepts to problems associated with formulation of pharmaceutical dosage forms.
5. Examine and analyse data from physicochemical experiments to: define the system under study and perform suitable calculations.

• Proactively investigates new knowledge, approaches or behaviour and takes steps to evaluate and improve performance (Self-learner)

6. Seek proactively new knowledge related to selected physicochemical concepts and their influence on practical aspects of daily life and more importantly on preparation of pharmaceutical dosage forms.

• Exhibit behaviors and values that are consistent with the trust given to the profession by patients, other healthcare providers, and society (Professional)

7. Demonstrate integrity by not cheating and not committing plagiarism.
8. Demonstrate respect to professors and classmates by observing active listening inside the classroom.

22. Topic Outline and Schedule:

Week	Lecture	Topic	Teaching Method (platform)	Evaluation Methods	References
1	1.1	Topic 1 Intermolecular forces: Introduction; Intramolecular interactions (Ionic bond, coordinate bond, covalent bond); intermolecular interactions; Van der Waals	Synchronous (MS Teams)	Exam	Textbook, handouts
	1.2	Intermolecular interactions; Ion-dipole interactions; Ion-induced dipole interactions; Hydrogen bonds.	Synchronous (MS Teams)	Exam	Textbook, handouts
2	2.1	Topic 2 States of matter: Gas state; the ideal gas law; kinetic molecular theory	Synchronous (MS Teams)	Exam	Textbook, handouts
	2.2	kinetic molecular theory; Van der Waals equation for real gases; liquid state; vapour pressure of liquids	Synchronous (MS Teams)	Exam	Textbook, handouts
3	3.1	Vapour pressure of liquids; Clausius-Clapeyron equation; Raoult's law	Synchronous (MS Teams)	Exam	Textbook, handouts
	3.2	Boiling point; liquefaction of gases	Synchronous (MS Teams)	Exam	Textbook, handouts
4	4.1	Aerosols; Solid state; crystalline solids; crystal lattice; crystal habit	Synchronous (MS Teams)	Exam	Textbook, handouts
	4.2	Crystalline solids, crystallization, polymorphism	Synchronous (MS Teams)	Exam	Textbook, handouts
5	5.1	Polymorphs examples; solvates, amorphous solids, melting point	Synchronous (MS Teams)	Exam	Textbook, handouts
	5.2	Melting point and heat of fusion, how to measure melting point	Synchronous (MS Teams)	Exam	Textbook, handouts
6	6.1	Topic 3 Phase Equilibria and Phase Rule: phase rule; definitions; applications	Synchronous (MS Teams)	Exam	Textbook, handouts
	6.2	One component systems; phase diagram of water	Synchronous (MS Teams)	Exam	Textbook, handouts
7	7.1	Condensed systems; Two component systems containing liquid phases/ phenol and water	Synchronous (MS Teams)	Exam/ assignment	Textbook, handouts
	7.2	Two component systems containing liquid phases/phenol and water	Synchronous (MS Teams)	Exam/ assignment	Textbook, handouts
8	8.1	Two component systems containing solid and liquid phases/ eutectic mixtures	Synchronous (MS Teams)	Exam	Textbook, handouts
	8.2	Phase equilibrium in three component systems	Synchronous (MS Teams)	Exam	Textbook, handouts
9	9.1	Ternary Systems with one pair of partially miscible liquids	Synchronous (MS Teams)	Exam	Textbook, handouts
	9.2	Topic 4 Physical properties of drug molecules: dielectric constant	Synchronous (MS Teams)	Exam	Textbook, handouts
10	10.1	Dipole moment and polarization	Synchronous (MS Teams)	Exam	Textbook, handouts
	10.2	Topic 5 Solutions of Nonelectrolytes: Definition, concentration expressions, ideal solutions, escaping tendency	Synchronous (MS Teams)	Exam/Quiz	Textbook, handouts
11	11.1	Raoult's law-ideal solution; real solutions	Synchronous (MS Teams)	Exam/Quiz	Textbook, handouts
	11.2	Colligative properties of solutions; vapour pressure lowering, boiling point elevation	Synchronous (MS Teams)	Exam/Quiz	Textbook, handouts
12	12.1	freezing point depression, osmotic pressure	Synchronous (MS Teams)	Exam/Quiz	Textbook, handouts
	12.2	Topic 6 Solutions of Electrolytes: colligative properties of electrolytes,	Synchronous (MS Teams)	Exam	Textbook, handouts
13	13.1	Arrhenius theory of electrolytic dissociation, theory of strong electrolytes.	Synchronous (MS Teams)	Exam	Textbook, handouts
	13.2	Topic 7 Isotonic Solutions: isotonic solutions; Measurement of tonicity, calculating tonicity using Liso value,	Synchronous (MS Teams)	Exam	Textbook, handouts
14	14.1	Methods of adjusting tonicity; Cryoscopic Method; NaCl Equivalent Method.	Synchronous (MS Teams)	Exam	Textbook, handouts
	14.2	Topic 8 Solubility: Solvent-Solute interaction, solubility of solids in liquids, solubility improvement.	Synchronous (MS Teams)	Exam	Textbook, handouts

23. Course Requirements:

Students should have:
- Computer
- Internet connection
- Webcam
- Active university account on Moodle (e-learning) website
- Active university account on Microsoft Teams

24. Evaluation Methods and Course Requirements:

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

Evaluation Activity	Mark	Topic(s)	Period (Week)	Platform
Midterm Exam	30	• Intermolecular forces • States of Matter • Phase Equilibria and Phase rule/ Phase diagram of water	To be determined ($\approx 7^{th}$ week)	To be determined
Assignment	10	• Phase Equilibria and Phase rule/ phenol and water	8^{th} week	Moodle (e-learning)
Quiz	10	• Solutions of nonelectrolytes	12^{th} week	Moodle (e-learning)
Final Exam	50	• All Topics	To be determined ($\approx 15^{th}$ week)	To be determined

25. Course Policies:

A- Attendance policies:
- As per the applicable university regulations

B- Absences from exams and handing in assignments on time:
- As per the applicable university regulations

C- Health and safety procedures:
- N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior:
- As per the applicable university regulations

E- Grading policy:
- **Midterm exam (30%)**
- **Course work (20%)**
- **Final exam (50%)**

Total 100%

F- Available university services that support achievement in the course:
- Moodle (e-learning) website
- Microsoft Teams institutional subscription

26. References:

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

- Martin's Physical Pharmacy and Pharmaceutical Sciences. 6th Edition. 2011. Published by Lippincott Williams & Wilkins, USA.

- Martin's Physical Pharmacy and Pharmaceutical Sciences. 5th Edition. 2006. Published by Lippincott Williams & Wilkins, USA.

- Physical Pharmacy, Physical Chemical Sciences, A.Martin et al., 4th Edition. 1993. Published by Lea and Febiger, USA.

B- Recommended books, materials, and media:

27. Additional information:

Name of Course Coordinator: **Dr. Dina El-Sabawi** Signature: ---------- Date: February 18th, 2021

Head of curriculum committee/Department: ----------Signature: ----------

Head of Department: **Dr. Dina El-Sabawi** Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

Dean: ---------- -Signature: ----------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File