Course Description Form

1. Course Name:
Physical pharmacy I (Theoretical+ Practical)
2. Course Code:
Phind25_214-
3. Semester / Year:
First semester/2025-2026
4. Description Preparation Date:
01/9/2025
5. Available Attendance Forms:
Students' signature on attendance sheet
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours Theoretical + 2 hours Practical (75) /4 units
7. Course administrator's name
Theoretical
Dr. Ali Alazzo Email: alialazzo@uomosul.edu.iq
Practical
Dr. Amina Mudhafar Al-Nima Email: amnah.mudhafar@uomosul.edu.iq
8. Course Objectives

Course Objectives	• Learning the physical principles that guide the pharmaceutical dosage form. • Understanding the basis of solubility, kinetics and drug delivery.
9. Teaching and Learning Strategies	
Strategy	Lecturing Seminars Homework Practical laboratory demonstrations and team lab work

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3+2	1. Understand the nature of the intra- and intermolecular forces that are involved in stabilizing molecular and physical structures. 2. Understand the differences in these forces and their relevance to different types of molecules. 3.Appreciate the differences in the strengths of the intermolecular forces that are responsible for the stability of structures in the different states of matter.	States of matter, binding forces between molecules, and The gaseous state	Theoretical lectures. Laboratory experiments	Paper-based exams
2	3+2	1. Understand the properties of the different states of matter. 2. Describe the pharmaceutical relevance of the different states of matter to drug	Liquids, solid and crystalline matters; The liquid crystalline state and The supercritical fluid state	Theoretical lectures. Laboratory experiments	Paper-based exams

		delivery systems by reference to specific examples given in the text boxes. 3. Describe the solid state, crystallinity, solvates, and polymorphism.			
3	3+2	1.Understand phase equilibria and phase transitions between the three main states of matter. 2. Understand the phase rule and its application to different systems containing multiple components.	Thermal analysis , phase equilib phase rule and solid dispersion	Theoretical lectures. Laboratory experiments	Paper-based exams
4	3+2	1.Identify and describe the four colligative properties of nonelectrolytes in solution. 2.Understand the various types of pharmaceutical solutions.	Solutions of non-electrolytes, properties and concentration expressions	Theoretical lectures. Laboratory experiments	Paper-based exams
5	3+2	1.Define ideal and real solutions using Raoult's and Henry's laws. 2.Calculate vapor pressure lowering, boiling point elevation, freezing point lowering, and pressure for solutions of nonelectrolytes.	ideal and real solutions, colliga properties, molecular we determination	Theoretical lectures. Laboratory experiments.	Paper-based exams
6	3+2	1.Understand the important properties of solutions of electrolytes. 2.Calculate the conductance of solutions, the equivalent conductance, and the equivalent conductance of electrolytes. 3.Apply the Arrhenius theory of electrolytic dissociation.	Solution of electrolytes, properties, Theory of dissociation, Theory of strong electrolytes	Theoretical lectures. Laboratory experiments	Paper-based exams
7	3+2	1.Calculate ionic strength. 2.Calculate osmotic coefficients, osmolality, and osmolarity. 3.Understand the differences between osmolality and osmolarity.	Ionic strength, Debye-Huchle theory, coefficients for expressi colligative properties	Theoretical lectures. Laboratory experiments	Paper-based exams
8	3+2	Define saturated solution, solubility, and unsaturated solution. Describe and give examples of polar, nonpolar, and semipolar solvents.	Solubility and distribution phenomena, solvent-solute interactions, solubility of gases liquids,	Theoretical lectures. Laboratory experiments	Paper-base exams
9	3+2	Define complete and partial miscibility.	Solubility of liquids in liquids, solubility of solids in liquids,	Theoretical lectures.	Paper-based exams

		Understand the factors controlling the solubility of weak electrolytes.		Laboratory experiments.	
10	3+2	Define **thermodynamic solubility** and **kinetic solubility**. Define **poor aqueous solubility** in the context of drug development. Describe experimental methods for determining solubility	Determining thermodynamic and kinetic solubility, Poor aqueous solubility, Measuring solubility	Theoretical lectures. Laboratory experiments	Paper-based exams
11	3+2	Describe what a distribution coefficient and partition coefficient are and their importance in pharmaceutical systems.	distribution of solutes between immiscible solvents.	Theoretical lectures. Laboratory experiments	Paper-based exams
12	3+2	1.Describe the Br¨onsted–Lowry and Lewis electronic theories. 2.Understand the concepts of acid–base equilibria and the ionization of weak acids and weak bases.	Ionic equilibria, modern theories acids, bases and salts, acid-base equilibria.	Theoretical lectures. Laboratory experiments	Paper-based exams
13	3+2	1.Calculate dissociation constants Ka and Kb and understand the relationship between Ka and Kb. 2.Understand the concepts of pH, pK, and pOH and the relationship between hydrogen ion concentration and pH.	calculation of pH, acidity constants, the effect of ionic strength and free energy	Theoretical lectures. Laboratory experiments	Paper-based exams
14	3+2	1.Understand the common ion effect. 2.Discuss the factors influencing the pH of buffer solutions.	Buffered and isotonic solutions: Buffer equation; buffer capacity	Theoretical lectures. Laboratory experiments	Paper-based exams
15	3+2	1.Describe the concept of tonicity and its importance in pharmaceutical systems. 2.Calculate solution tonicity and tonicity adjustments.	isotonic solutions	Theoretical lectures. Laboratory experiments	Paper-based exams

11. Course Evaluation

- 20 M Theoretical assessment;
  (paper-based mid-term exam + quiz + attendance + seminar)
- 20 M practical assessment (attendance + quiz + practice)
- 60 M paper-based theoretical final exam

Total 100 M

12. Learning and Teaching Resources

Required textbooks	1- Alfred Martin et al, Physical Pharmacy,6th edition,2010.

	2- Laboratory Manual for Practical Physical pharmacy adopted by the department.
Main references (sources)	1- **Physicochemical Principles of Pharmacy** by Alexan Taylor Florence and David Attwood. 2- **Fast track: Physical Pharmacy** by Alexander Taylor Flore and David Attwood.
Electronic References, Websites	