

Course Description Form

1. Course Name:					
Physical pharmacy II (Theoretical+ Practical)					
2. Course Code:					
Phind25 2210-					
3. Semester / Year:					
Second semester/2025-2026					
4. Description Preparation Date:					
15/1/2026					
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		<ul style="list-style-type: none"> • 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	Define complexation and explain its importance in pharmaceutical systems. Classify complexes based on their structure and bonding Describe analytical methods used to study complex formation	Complexation Classification of complexes, Metal complexes Organic molecular complexes Inclusion compounds, Methods of analysis	Theoretical lectures. Laboratory experiments	Paper-based exams
2	3+2	Define diffusion and explain its significance in pharmaceutical systems. State and explain Fick's first law mathematically Explain Fick's second law in relation to non-steady-state diffusion	Diffusion Introduction , Steady state diffusion , Fick's first law of diffusion, Fick's second law	Theoretical lectures. Laboratory experiments	Paper-based exams

3	3+2	Describe the mechanism of drug diffusion across biological and synthetic membranes. Relate permeability to diffusion coefficient and membrane properties. Explain the setup and working principles of diffusion apparatus.	Diffusion through membranes, Permeability, Diffusion driving forces, Lag time, Apparatus and methods for assessing drug diffusion	Theoretical lectures. Laboratory experiments	Paper-based exams
4	3+2	Define reaction rate, reaction order, and molecularity. Understand and apply apparent zero-order kinetics to the practice of pharmacy. Calculate half-life and shelf life of pharmaceutical products and drugs.	Chemical kinetics stability, rate and order reactions,	Theoretical lectures. Laboratory experiments	Paper-based exams
5	3+2	Describe the influence of temperature, ionic strength, solvent, pH, and dielectric constant on reaction rates.	Influence of temperature and other factors on reactions rate	Theoretical lectures. Laboratory experiments	Paper-based exams
6	3+2	Calculate the increase in rate constant as a function of temperature. Describe the factors that influence solid-state chemical kinetics.	Decomposition of medicinal agents accelerated stability analysis.	Theoretical lectures. Laboratory experiments.	Paper-based exams
7	3+2	Differentiate among different types of interfaces and describe relevant examples in the pharmaceutical sciences. Understand the terms surface tension and interfacial tension and their application in pharmaceutical sciences. Calculate surface and interface tensions, surface free energy, its changes, work of cohesion and adhesion, and spreading coefficient for different types of interfaces.	Interfacial phenomena Classification of interfaces, Liquid interfaces, Surface and interfacial tensions, Surface free energy, Measurement of interfacial tension, Spreading coefficient	Theoretical lectures. Laboratory experiments	Paper-based exams
8	3+2	Understand the mechanisms of adsorption on liquid and solid interfaces. Classify surface-active agents and appreciate their applications in pharmacy.	Adsorption at liquid interfaces, surface-active agents, Systems of HLB Classification, Adsorption at solid interfaces, The solid gas interface, The solid liquid interface, Wetting and wetting agents	Theoretical lectures. Laboratory experiments	Paper-based exams

9		Understand the Electric properties of interfaces and application in pharmaceutical sciences.	Electric properties of interfaces	Theoretical lectures. Laboratory experiments	Paper-base exams
10	3+2	Differentiate between different types of colloidal systems and their main characteristics.	Colloids, dispersed system and its pharmaceutical application, types of colloidal systems	Theoretical lectures. Laboratory experiments.	Paper-based exams
11	3+2	Define rheology, provide examples of fluid pharmaceutical products exhibiting various rheologic behaviors, and describe the application of rheology in the pharmaceutical sciences and practice of pharmacy. Differentiate flow properties and corresponding rheograms between Newtonian and non-Newtonian materials.	Rheology, Newtonian and non-newtonian systems,		
12	3+2	Define thixotropy as a time-dependent shear-thinning behavior Explain the structural breakdown and recovery process under shear..	Thixotropy, and determination of thixotropy.	Theoretical lectures. Laboratory experiments	Paper-based exams
13	3+2	Define micrometrics and explain its importance in pharmaceutical sciences. Describe particle size distribution and its significance. Describe and compare common techniques for determining particle size	Micrometrics Particle size and size distribution Methods of determining particle size Particle shape and surface area	Theoretical lectures. Laboratory experiments	Paper-based exams
14	3+2	Students should be able to explain and evaluate the following: Porosity and Packing Arrangements, Densities of Particles, Bulkiness, Flow Properties	Methods for determining surface area, Derived properties of powders (porosity, packing arrangements, densities of particles, bulkiness and flow properties)	Theoretical lectures. Laboratory experiments	Paper-based exams
15	3+2	Define polymers and explain their importance in pharmaceutical applications. Define copolymers and distinguish between their types Define and differentiate between: <ul style="list-style-type: none">• Thermoplastic polymers	Pharmaceutical polymers Introduction (history, general concepts, synthesis) Copolymers and polymer blends	Theoretical lectures. Laboratory experiments	Paper-based exams

		<ul style="list-style-type: none"> Thermosetting polymers 	Thermoplastic and thermoset polymers		
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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	<ol style="list-style-type: none"> Alfred Martin et al, Physical Pharmacy, 6th edition, 2010. Laboratory Manual for Practical Physical pharmacy adopted by the department.
Main references (sources)	<ol style="list-style-type: none"> Physicochemical Principles of Pharmacy by Alexander Taylor Florence and David Attwood. Fast track: Physical Pharmacy by Alexander Taylor Florence David Attwood.