

**Punjab University College of
Pharmacy Faculty of Pharmacy
University of the Punjab, Lahore
Course Outline**



Programme	Pharm.D 2nd Semester	Course Code	PHARM-111(Theory), PHARM-112 (Lab)	Credit Hours	3+1
Course Title	Physical Pharmacy-II				
Course Introduction					
Physical pharmacy is a foundational pharmaceutical science that applies physical and chemical principles to the development, evaluation, and stability of drug dosage forms. It bridges chemistry, physics, and pharmacy to understand how drug molecules behave, ensuring effective, stable, and bioavailable medication delivery systems. It acts as a bridge between basic sciences and practical pharmacy, focusing on preformulation, stability, and drug delivery systems to ensure therapeutic effectiveness. Key areas include solubility, rheology, micromeritics, and kinetics.					
Key Aspects of Physical Pharmacy:					
• Preformulation Studies: Evaluates the physical and chemical properties of a drug substance (e.g., solubility, particle size, polymorphism) before formulating it into a stable dosage form. • Dosage Form Design: Utilizes principles like surface tension and interfacial phenomena to create stable suspensions, emulsions, and tablets. • Stability and Kinetics: Predicts the shelf-life of products by understanding drug degradation rates (hydrolysis, oxidation). • Drug Delivery: Enhances the delivery of drugs to target sites within the body by managing physicochemical characteristics.					
Learning Outcomes					
On the completion of the course, the students will be able to explain basic physicochemical principles relevant to drug delivery systems and formulations.					
Course Content (Theory)			Assignments/Readings		
Week 1	Surface and Interfacial Phenomena: i. Surface and interfacial tension. ii. Types of surfactants, techniques to reduce surface tension, and pharmaceutical applications.		Adejare, A. (2020). Remington: The Science and Practice of Pharmacy: Academic Press.		

Week 2	Micellization and its application in dosage forms.	Al-Achi, A., Gupta, M. R., & Stagner, W. C. (2022). <i>Integrated Pharmaceutics: Applied Preformulation, Product Design, and Regulatory Science</i> : Wiley. Allen, L. V. (2021). <i>Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems</i> : Wolters Kluwer Health.
Week 3	Adsorption: Mechanisms, types of adsorption, adsorption isotherms.	Anderson, S. (2005). <i>Making Medicines: A Brief History of Pharmacy and Pharmaceuticals</i> : Pharmaceutical Press.
Week 4	Disperse Systems: i. Colloids: Introduction, types, methods of preparation, optical/kinetic/electrical properties, stability and pharmaceutical applications.	British Pharmacopeia Commission (2024). <i>British Pharmacopeia 2025</i> . Medicines and Healthcare Products Regulatory Agency.
Week 5	Emulsions: Types, theories of emulsification, emulsifying agents (classification and properties), stability issues, pharmaceutical applications. iii. Suspensions: Types, methods of preparation, properties, types of suspending agents, stability concerns, pharmaceutical applications.	Brun, P. L., Crauste-Manciet, S., Krämer, I., Smith, J., & Woerdenbag, H. (2023). <i>Practical Pharmaceutics: An International Guideline for the Preparation, Care and Use of Medicinal Products</i> : Springer International Publishing. Assignment: Differentiate between emulsions and suspensions and make a table on the chart paper.
Week 6	Rheology: i. Fluid flow behaviors, Rheograms	Assignment: Different terminologies regarding rheology with examples
Week 7	1. Newtonian and non-Newtonian liquids. 2. Thixotropy, anti-thixotropy, and rheopexy.	Denton, P., & Rostron, C. (2013). <i>Pharmaceutics: The Science of Medicine Design</i> : OUP Oxford. 8.
Week 8	Factors affecting and significance in pharmaceutical formulations.	<i>European Pharmacopeia (11th edition)</i> . European Directorate for the Quality of Medicines & Healthcare. Assignment:

		Enlist materials on daily basis usage showing non Newtonian behavior.
Week 9	Stability Studies in Pharmacy: i. Introduction, factors affecting stability, types of stability studies.	Fahr, A., & Scherphof, G. L. (2018). <i>Voigt's Pharmaceutical Technology</i> : Wiley. 10. Lovett, A. W. (2014). <i>Introduction to the Pharmacy Profession</i> : Jones & Bartlett Learning. Assignment: Types of stability studies and also rate and order of reactions.
Week 10	ii. Rate of reactions and order of kinetics	Ma, J. K. H., & Hadzija, B. (2013). <i>Basic Physical Pharmacy</i> : Jones & Bartlett Learning
Week 11	Drug degradation: Phase separation, hydrolysis, oxidation, photolysis and other pathways of drug degradation. Role of pH, temperature and ionic strength.	Sinko, P. J. (2023a). <i>Martin's Physical Pharmacy and Pharmaceutical Sciences</i> : Wolters Kluwer Health. 13. Swarbrick, J. (2013). <i>Encyclopedia of Pharmaceutical Science and Technology, Fourth Edition, Six Volume Set (Print)</i> : Taylor & Francis. Assignment: Effect of degradation on different formulations.
Week 12	Unit Operations in Pharmacy: i. Introduction to terminologies and concepts of Precipitation, crystallization	Taylor, K., & Aulton, M. E. (2021). <i>Aulton's Pharmaceutics: The Design and Manufacture of Medicines</i> : Elsevier. 15. <i>United States Pharmacopeia-National Formulary (USP-NF 2024)</i> . United States Pharmacopeial Convention
Week 13	evaporation, distillation, efflorescence, deliquescence, lyophilization, elutriation, desiccation, ignition,	
Week 14	fusion, sublimation, calcination, decantation, adsorption,	
Week 15	centrifugation, trituration, levigation, and dialysis.	Zebroski, B. (2015). <i>A Brief History of Pharmacy: Humanity's Search for Wellness</i> : Taylor & Francis.
Week 16	Revision of all the syllabus, and presentations of the topics.	

Textbooks and Reading Material				
Main source: Adejare, A. (2020). Remington, Al-Achi, A., Gupta, M. R., & Stagner, W. C. (2022). <i>Integrated Pharmaceutics: Applied Preformulation, Product Design, and Regulatory Science</i> : Wiley.				
Other sources: Allen, L. V. (2021). <i>Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems</i> : Wolters Kluwer Health.				
• Anderson, S. (2005). <i>Making Medicines: A Brief History of Pharmacy and Pharmaceuticals</i>: Pharmaceutical Press. • British Pharmacopeia Commission (2024). <i>British Pharmacopeia 2025</i>. Medicines and Healthcare Products Regulatory Agency. • Brun, P. L., Crauste-Manciet, S., Krämer, I., Smith, J., & Woerdenbag, H. (2023). <i>Practical Pharmaceutics: An International Guideline for the Preparation, Care and Use of Medicinal Products</i>: Springer International Publishing. • Denton, P., & Rostron, C. (2013). <i>Pharmaceutics: The Science of Medicine Design</i>: OUP Oxford. • <i>European Pharmacopeia (11th edition)</i>. European Directorate for the Quality of Medicines & Healthcare. • Fahr, A., & Scherphof, G. L. (2018). <i>Voigt's Pharmaceutical Technology</i>: Wiley. • 10. Lovett, A. W. (2014). <i>Introduction to the Pharmacy Profession</i>: Jones & Bartlett Learning.				
Course content (Practical/lab)				
1.Preparation of castor oil emulsion				
2.Preparation of liquid paraffin emulsion				
3.Preparation of distilled water by distillation assembly.				
4.Determination of viscosity of liquids by Ostwald viscometer.				
5.Measurement of surface tension of liquids by stalagmometer.				
6.Separation of three compounds by shake flask extraction.				
7.Determination of log P values for acidic and basic compounds.				
8.Preparation of silver chloride precipitates.				
9.Kinetics of Acetylsalicylic acid hydrolysis.				
10. Estimation of Critical micelle concentration of a surfactant in water.				
Assignments: Types and Number with Calendar				
Assignment/presentation (20 marks)			Class quiz (30 marks)	
No.	Week	Deadline for submission	No.	Week
Assignment 1 (Pre-mid)	Week 3	Within the timeline assigned by the teacher	Quiz 1 (pre-mid)	Week 4
			Quiz 2 (pre-mid)	Week 7
Assignment 2 (Post-mid)	Week 11		Quiz 3 (post-mid)	Week 10
			Quiz 4 (post-mid)	Week 14