



Course Syllabus

Course Code	Course Title	ECTS Credits
IMPH-210	Physical Chemistry and Physical Pharmacy/ Φυσικοχημεία και Φυσικοφαρμακευτική	6
Prerequisites	Department	Semester
IMPH-110, IMPH-150	Health Sciences	Fall/Spring
Type of Course	Field	Language of Instruction
Compulsory	Pharmacy	Greek/English
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Dr Christou Stavroula/Ms Savva Maria/Ms Loizou Maria	2 nd
Mode of Delivery	Work Placement	Corequisites
Face-to-Face	N/A	N/A

Course Objectives:

The main objectives of the course are to explain the basic physicochemical principles that apply in pharmaceuticals, demonstrate how these principles can be used for the rational selection and design of drugs and pharmaceutical dosage forms, and provide the basis for understanding the physicochemical phenomena that govern the *in vitro* and *in vivo* activity of drugs and pharmaceutical products. It is a fundamental course, since it leads to the proper comprehension of subsequent courses, such as Pharmaceutical Technology, as well as Biopharmaceutics and Pharmacokinetics

Learning Outcomes:

After completion of the course students are expected to be able to:

- Display knowledge and understanding of the drugs' physicochemical properties and their importance in dosage form design and *in vivo* activity
- Comprehend the laws of thermodynamics
- Outline the impact of enthalpy, entropy and Gibbs energy on chemical reactions and drug solubility
- Demonstrate an ability to estimate drug stability based on formulation parameters and chemical kinetics

- Recognize drug solubility issues and how they can be solved
- Identify the factors influencing drug absorption through biological membranes and how it can be estimated
- Identify the properties of surfactants and their role in various drug delivery systems and phenomena such as absorption and solubilization
- Recognize the various disperse systems (e.g., suspensions, emulsions) and discuss issues related to their stability
- Describe the rheology of liquids and semi-solids and its importance on drug delivery systems

Course Content:

- Properties of solids (e.g., crystal structure and form, polymorphism, crystal hydrates, amorphous solids)
- Brief review of gas properties with emphasis on vapor pressure and gas solubility
- Physicochemical properties of drugs in solution (e.g., activity, chemical potential, osmotic properties, ionization, diffusion)
- Overview of the first and second law of thermodynamics (e.g., entropy, enthalpy, heat capacity, Gibbs energy)
- Drug stability (e.g., decomposition and kinetics, factors influencing stability)
- Drug solubility (e.g., definition, expressions of solubility, factors influencing solubility, cyclodextrins as solubilizing agents, solubility problems, partitioning, logP)
- Drug absorption through biological membranes (e.g., lipophilicity, permeability, pH-partition hypothesis)
- Surfactants (e.g., definition, properties, micellization, liquid crystals, solubilization)
- Emulsions, suspensions and other disperse systems (e.g., classification, colloid stability, types and properties of colloidal systems)
- Rheology (e.g., rheological properties of Newtonian and non-Newtonian liquids)
- Physicochemical drug interactions and incompatibilities (e.g., pH effects, dilution of mixed solvent systems, ionic interactions, chelation, complexation, drug absorption)

Learning Activities and Teaching Methods:

Lectures, class discussion, practice problems solved in class, laboratory exercises.

Assessment Methods:

Final exam, Midterm exam, Lab reports and exam

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Physicochemical Principles of Pharmacy, 6th edition	Florence, Alexander T; Attwood, David	PhP	2015	9780857111746
Physical Chemistry for the Biosciences	Raymond Chang	Elsevier	2014	9781455758883
FASTtrack: Physical Pharmacy, 2nd edition	Attwood, David; Florence, Alexander T.	University Science Books	2005	9781891389337
Φυσική Φαρμακευτική: FASTtrack (2η έκδοση)	Attwood, David; Florence, Alexander T. (Επιμέλεια: Κ. Ν. Δεμέτζος)	PhP	2012	9780857110640
Μαθήματα Φυσική Φαρμακευτικής	Κτίστης Γεώργιος	Παρισιάνος	2014	9789605830267