



Course Syllabus

Course Code	Course Title	ECTS Credits
IMPH-345	Biopharmaceutics/ Βιοφαρμακευτική	6
Prerequisites	Department	Semester
IMPH-300, IMPH-215, IMPH-365	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 Prapopoulou Maria	3 rd
Mode of Delivery	Work Placement	Corequisites
Face-to-Face	N/A	N/A

Course Objectives:

Biopharmaceutics is a major branch in pharmaceutical sciences, which relates the physicochemical properties of a drug in dosage form with the pharmacology, toxicology, or clinical response observed after its administration. It basically introduces the notions of absorption, distribution, metabolism, and excretion of medicine in the body, and correlates the physical/chemical properties of the drug, the formulation parameters of the dosage form in which the drug is given, and the route of administration with the drug's efficacy and safety.

The primary aims of the course are students to:

- Acquire the scientific background related to the drug delivery mechanisms, the rates in which the relative processes take place and the bioavailability parameters.
- Understand the drug's release and absorption processes during per os administration, as well as the characteristics of the drug's movement along the gastrointestinal tract and its passage through it;
- Familiarize themselves with the absorption mechanisms that occur through alternative routes of administration, such as transdermal administration, intramuscular administration, rectal and nasal administration,
- Comprehend the phenomena that occur after the drug is introduced into the bloodstream (e.g., distribution of drug in the body, protein binding, metabolism, and excretion).

Learning Outcomes:

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

- Know the transport mechanisms of active substances and the parameters related to their bioavailability.
- Explain the drug release mechanisms from the various dosage forms, of both immediate and prolonged release.
- Identify the factors that affect the drug's absorption and are related to the organism, the physicochemical characteristics of the active substance and the formulation's parameters.
- Understand the biopharmaceutical classification system.
- Define the factors that influence the movement of the drug into the gastrointestinal tract after per os administration.
- Describe the processes and mechanisms by which drugs penetrate the gastrointestinal epithelium and enter the bloodstream.
- Indicate the basic features of absorption by other routes of administration, such as transdermal, intramuscular, nasal, rectal administration, etc.
- Explain the phenomena that occur after the drug enters the bloodstream, and in particular the processes of its distribution to body tissues and its possible attachment to plasma proteins.
- Know the mechanisms by which active substances are metabolized and removed from the body, such as first-pass metabolism, renal and hepatic clearance.

Course Content:

Introduction: Definitions of basic biopharmaceutical terms related to drug delivery mechanisms, rates of individual processes (e.g. zero- and primary kinetics), bioavailability and bioequivalence.

Per os administration: drug release processes into the gastrointestinal fluid from immediate and modified release drug delivery systems, movement of dosage forms along the gastrointestinal tract, anatomy and physiology of the gastrointestinal tract and factors affecting drug penetration through the gastrointestinal epithelium (barriers, absorption mechanisms, physicochemical properties of the active substance, and formulation parameters).

Other routes of administration: drug absorption after administration through the skin (transdermal), rectum, lungs, intramuscular, nasal, sublingual etc.

Bloodstream phenomena: drug distribution in body tissues and organs (apparent volume of distribution, endothelial membrane transport), plasma protein binding.

Metabolism and excretion: first passage effect (biotransformation in gastrointestinal mucosa and liver and its importance in bioavailability), renal and hepatic clearance

Learning Activities and Teaching Methods:

Lectures, personal and group assignments, videos, simulation and calculation of biopharmaceutical parameters using computer and special software.

Assessment Methods:

Final exam, Assignments, Midterm exam

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Applied Biopharmaceutics & Pharmacokinetics, Seventh Edition	Leon Shargel, Andrew B.C. Yu	The McGraw-Hill Companies	2016	978-0071830935