GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basic Pharmacology, PG_00037514		
Field of study	Biotechnology		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Agnieszka Potęga	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	2.0	18.0	50

Subject objectives

The aim of the course is to deepen students' knowledge of the fundamentals of pharmacology, particularly the molecular mechanisms of action of medicinal substances, pharmacokinetics, pharmacodynamics, and the safety of their use, as well as to develop engineering competencies in applying knowledge of chemistry and biochemistry to analyse and predict the properties of medicinal substances, their interactions with biomolecules, and the processes associated with their action, metabolism, and elimination in biological systems, and to solve basic problems in biotechnology and pharmaceutical technology.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W05	knows and can explain the basic concepts of pharmacology, the molecular and biochemical mechanisms of action of medicinal substances, their fate in the body, and the fundamental principles of safe drug use.	[SW1] Assessment of factual knowledge
K6_U02	is able to apply knowledge of chemistry and biochemistry to analyse the properties of medicinal substances and predict their transport across biological membranes, distribution, biotransformation, elimination, and interactions with biomolecules.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture
- Introductory information - definitions (active substance, drug, poison, potency, efficacy, pharmacology), drug action (pharmaceutical phase, pharmacokinetic phase, pharmacodynamic phase), methods and places of drug administration.
- Drug absorption and transport across membranes.
- Distribution of the drug in the body - compartments, protein binding, distribution factors.
- Biotransformation - phase I reactions (oxidation, reduction, hydrolysis, decarboxylation), phase II reactions (conjugation with endogenous substrates), induction of drug transporting and metabolizing proteins, first pass effect, inhibition of enzymatic activity, bioinactivation and bioactivation, factors influencing biotransformation.
- Excretion.
- Pharmacokinetics - pharmacokinetic parameters (bioavailability, bioequivalence, elimination half-life, minimal therapeutic concentration and minimal toxic concentration) and pharmacokinetic models, pharmacokinetics in special situations - pathological conditions, the elderly).
- Pharmacodynamics - mechanisms of drug action, pharmacological action through receptors (the concept of a receptor, types and subtypes of receptors, receptor reserve, agonists and antagonists, ion channels).
- Dosage and drug action dependence on dose or concentration - dependence curves, indices and pharmacological values.
- Adverse drug reactions - drug allergic reactions, side effects, drug dependence, drug interactions.
- Searching for and testing new drugs - preclinical and clinical trials, placebo action, types of drug testing.
- Applied pharmacy - drug forms and methods of preparation (powders, granules, tablets, capsules, liposomes, microspheres, medicinal aerosols, syrups, ointments, creams, parenteral drugs), drug administration routes, injection drug form technology (ampoules, vials).</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of biochemistry and enzymology.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written test, part 2 - lecture material 6 - 9.</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Written test, part 1 - lecture material 1 - 5.</td><td>60.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. E. Mutschler, G. Geisslinger, H. J. Kroemer, P. Ruth, M. Schäfer-Korting. Pharmacology and Toxicology. Textbook. Third revised and expanded Polish edition. Scientific editor: W. Buczko. MedPharm Polska, 2013.
2. S. Janicki, A. Fiebiga, M. Sznitowska. Applied Pharmacy. Textbook for Pharmacy Students. 4th edition. PZWL Medical Publishing, Warsaw, 2012.</td></tr>
<tr><td>Supplementary literature</td><td>Review papers in scientific journals provided by the lecturer.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Sample questions:

1. Define the terms: AUC and drug bioavailability - show how these kinetic parameters can be determined.
2. List the mechanisms of transport and absorption through biological membranes. Characterize active transport.
3. List the main enzymes of phase I and II metabolism. Characterize the physiological function of one family of isoenzymes from each group, also giving examples of catalyzed reactions.
4. In which compartment of the body/cell will highly lipophilic drugs be located? How can the solubility of organic active substances in an aqueous environment be improved.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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