GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	FOUNDATIONS OF PHARMACOLOGY, PG_00066138		
Field of study	Chemistry		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Specialty subject group
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Agnieszka Potęga	
	Teachers		

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	0.0	0.0	15.0	35
	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	35	5.0	35.0	75

Subject objectives	The aim of this subject is to provide the basic knowledge on th mode of drug action on healthy and diseased organisms. The course will discuss processes related to pharmacokinetics, describing the routes of administration and absorption of a drug and its distribution in the body. Issues related to metabolism and excretion of the drug from the body will also be presented. Knowledge of pharmacodynamics will allow to understand the effect of the drug at the target site.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W01] recognizes problems of modern chemistry, including properties and obtaining chemical compounds, necessary for making calculations, including the dependence of the compound's structure and its reactivity	The student recognizes the relationships between the chemical structure of a compound and its physical, chemical, and pharmacological properties. He/she can predict the effect of changes in structure on the biological activity and reactivity of a compound, enabling the evaluation of its applications in therapy. Understands the challenges of modern medicinal chemistry, including optimization of pharmacological properties, efficiency of synthesis, and reduction of adverse reactions.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	[K7_K02] is able to cooperate and work in a group, taking on different roles	The student knows and understands the stages of implementation of new drugs. He/she is aware of the scale of synthesis of implemented drugs and is able to optimize and/or propose a less cumbersome method of synthesis of implemented/existing drugs.	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_W04] indicates methods for the synthesis of chemical compounds with defined properties	The student applies knowledge of the synthesis of chemical compounds to develop new drugs or modify existing drugs to meet therapeutic needs and minimize side effects. Is familiar with techniques used to analyze the purity, structure, and biological activity of compounds, such as chromatography, mass spectroscopy, and NMR. Is concerned with safety and adheres to ethical standards in the design and synthesis of new chemicals in pharmacology.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
	[K7_U01] integrates and interprets information from literature, databases and other sources	The student analyzes and interprets key information in the field of pharmacology using literature and databases. He/she draws conclusions about the mechanisms of action of drugs, their clinical applications, and adverse effects. He/she can identify potential errors and limitations in the available material and evaluate its practical application in pharmacotherapy. Prepare a presentation on a chosen topic, taking into account the current state of knowledge. Communicate effectively the results of the analysis, presenting them in an understandable and reliable manner.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
Subject contents	Basic considerations. Drug action. Pharmaceutical phase. Pharmacokinetic phase. Pharmacodynamic phase (discussion of these concepts). Methods and sites of drug administration. Absorption of the drug barriers to absorption, mechanisms of absorption (diffusion, active transport, phagocytosis). Sites of administration versus absorption. Distribution of the drug in the body and factors affecting distribution (binding to proteins). Biotransformation. Phase I reactions role of cytochrome P450. Phase II reactions conjugation reactions. First-pass effect. Enzymatic induction. Excretion. ABC transport proteins. Pharmacokinetics. Pharmacokinetic parameters. Bioavailability and bioequivalence. Elimination half-life. Therapeutic concentrations. Toxic concentrations. Pharmacokinetic models one-compartment model, two-compartment model and changes in plasma drug concentration after intravenous administration. Concentration changes after oral administration. Pharmacokinetics in special cases pathological states. Pharmacodynamics. Receptor action of drugs. The concept of a receptor. Types and subtypes of receptors (membrane, intracellular). Ion channels. Agonists and antagonists. Mechanisms of action of drugs. Dose-effect relationship. Dependence curves. Allergic reactions. Adverse effects of drugs. Drug dependence. Exploration and testing of new drugs. Phases of clinical trials.		
Prerequisites and co-requisites	Knowledge of basic Biochemistry is required.		

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<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written colloquium part 1 - 60 minutes .</td><td>60.0%</td><td>65.0%</td></tr>
<tr><td>Multimedial presentation on a given subject during seminar</td><td>60.0%</td><td>35.0%</td></tr>
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<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>• E. Mutschler, G. Geisslinger, H.J. Kroemer, P. Ruth, M. Schäfer-Korting. Pharmacology and toxicology. Textbook. Polish edition III revised and supplemented. Scientific editing by W. Buczko. MedPharm Poland 2013.</td></tr>
<tr><td>Supplementary literature</td><td>No requirements.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Example questions:

1. Define the terms: AUC and bioavailability of a drug - present how these kinetic parameters can be determined.
2. List the mechanisms of transport and absorption across biological membranes. Characterize active transport.
3. List the main enzymes of phase I and phase II metabolism. Characterize the physiological function of one family of isoenzymes from each group giving also examples of catalyzed reactions.
4. In what body/cell compartment will drugs with high lipophilicity localize? How to improve the solubility of organic active substances in an aqueous environment?

In what compartment of the body / cells will be located medicines with high lipophilicity? How to improve the solubility of organic active substances in the aqueous solutions?</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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