University of Gdańsk

Subject card

Subject name and code	Chemistry of pharmaceutical compounds, PG_00081940		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Medical Chemistry -> Department of Biomedical Chemistry -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Marta Spodzieja	
	Teachers	dr hab. Marta Spodzieja	

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	5.0	15.0	50

Subject objectives

- Introduction students into fundamental terms used in medicinal chemistry, as e.g. therapeutic index, lead compound (structure), drug target, farmacokinetics and also with a basic studies performed during drug elaboration.
- Introduction students with fundamental knowledge concerning the way from lead structure to medicineused in clinical practice, sources of lead compounds and its typical modifications used for elaboration of new, clinically useful compound.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	student carries out a complex synthesis of an organic compound with properties medicinal products using the Polish-language literature procedure	[SU4] test/exam - oral or written
[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.	On the examples of selected groups of drugs, proposes modifications of their chemical structure leading to desired changes of their biological activity profile (e.g. selectivity), ability to penetration of biological barriers, chemical stability and metabolic susceptibility.	[SK4] test/exam - oral or written
[CHEML3_U04] Plans and performs simple chemical experiments and analyses the results obtained.	student carries out a complex synthesis of an organic compound with properties medicinal products using the Polish-language literature procedure student argues judgments based on the collected experimental results and draws conclusions through logical reasoning	[SU4] test/exam - oral or written
[CHEML3_K03] Establishes priorities in the right way for the implementation of tasks specified by herself/himself and/or by others.	student designs paths for distinguishing individual medicinal substances in a series of several compounds belonging to different structural groups	[SK4] test/exam - oral or written
[CHEML3_W03] Explains the relationship between the structure of matter and its observed properties.	Outlines the key sources of lead compounds and the methods used for their quest. Describes fundamental modifications of lead structure performed in the initial stage of search for drugs.	[SW4] test/exam - oral or written
[CHEML3_K06] Raises her/his professional and personal competences by using information provided in various sources.	Appreciate of the social and economical importance of research aimed at finding and elaboration of new drugs;	[SK4] test/exam - oral or written
[CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.	Defines fundamental (can define) fundamental terms from medicinal chemistry area, contained in the course content.	[SU4] test/exam - oral or written
[CHEML3_K08] Formulates opinions in the field of science with caution and criticism in their expression.	student argues judgments based on the collected experimental results and draws conclusions through logical reasoning	[SK4] test/exam - oral or written
[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	student designs paths for distinguishing individual medicinal substances in a series of several compounds belonging to different structural groups	[SU4] test/exam - oral or written
[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	student retains care during work with substances with putative biological/phamacological activity	[SK4] test/exam - oral or written
[CHEML3_W05] Has basic knowledge of the chemical specialisation studied.	Have knowledge about obstacles to the site of action and how the compound may be metabolized and eliminated from organism.	[SW4] test/exam - oral or written
[CHEML3_U09] Is able to learn independently.	student uses the literature to prepare for written tests	[SU4] test/exam - oral or written
[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	student is able to describe general methods of detecting and identifying individual pharmacological compounds from the groups specified in the program content	[SW4] test/exam - oral or written

Course outcome	Subject outcome	Method of verification
[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	student carries out a complex synthesis of an organic compound with properties medicinal products using the Polish-language literature procedure	[SW4] test/exam - oral or written
[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	student determines the content of the active substance in a commercial simple drug, using pharmacopoeial procedures for quantitative analysis and basic chemical calculations	[SU4] test/exam - oral or written
[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	student develops and analyzes the results of tasks specified in the program content	[SU4] test/exam - oral or written

Subject contents

- Biological activity and therapeutical index.
- Fundamental drug targets: proteins, nucleic acids, lipids.
- Receptors and enzymes as a drug target.
- Peptides and proteins as a drugs.
- Antibodies as a drugs.
- Nucleic acids and their interactions with drugs.
- Drugs from idea to their implementation into the clinical practice.
- Lead structure. Sources of lead compounds, Modifications of lead structure.
- Structure-activity relationship.
- Quantitative methods of structureactivity relationship (QSAR) studies and their application id drug design.
- Drug forms and their administration.
- Synergy of drug activities.
- Farmacokinetics. Chemical stability of drug and its metabolic resistance, biological barriers overcoming.
- Pro-drugs and their practical applications.
- Examples of antibacterial drugs. Sulfonamides and -lactam antibiotics. Antibiotics disturbing protein synthesis, transcription and replication of nucleic acids.
- Drug resistance of bacteria. Causes of bacterial drug resistance.

Prerequisites and co-requisites

Finished Organic Chemistry, General Chemistry and Analytical Chemistry courses.

- knowledge of a fundamental calculations applied in analytical chemistry,
- knowledge of the basic health and safety rules in chemical laboratory,
- ability to work with laboratory glass and principal laboratory apparatus applied in chemical synthesis and analysis

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written exam ((a necessary condition for taking the exam is obtaining a positive grade in laboratory exercises)	51.0%	100.0%

Recommended reading

Basic literature	Extracurricular readings
	• Graham L. Patrick. Chemia medyczna. Podstawowe zagadnienia, wyd. WNT, Warszawa, 2003 • Graham L. Patrick. Krótkie wykłady. Chemia leków, wyd. PWN, Warszawa 2004. • R.B. Silverman, Chemia organiczna w projektowaniu leków, wyd. WNT, Warszawa, 2004 • Praca zbiorowa pod red. K. Kieć-Kononowicz, Wybrane zagadnienia z metod poszukiwania i otrzymywania ś
Supplementary literature	• Zdzisław Markiewicz, Zbigniew A. Kwiatkowski Bakterie antybiotyki lekooporność, wyd. PWN, Warszawa 2001. \ • Alojzy Zgirski, Roman Gondko Obliczenia biochemiczne, wyd. PWN, Warszawa 1998. • Marianna Zając, Ewaryst Pawełczyk Chemia leków, Wydawnictwo Akademii Medycznej im. Karola Marcinkowskiego, Poznań 2000. • Alfred Zejca, Maria Gorczyca Chemia leków, wyd. PZWL, Warszawa 2004

	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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