GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Chemistry and Technology of Bioactive Compounds, PG_00054748		
Field of study	Biotechnology		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Andrzej Skwarecki	
	Teachers	dr inż. Andrzej Skwarecki	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	0.0	0.0	0.0	0.0	45

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	45	3.0	27.0	75

Subject objectives

The main aim is to familiarize the students with modern medicinal chemistry issues.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W03	The student knows the main organic reactions used in drug synthesis. The student is able to carry out a retrosynthetic analysis. The student knows the drug development way from finding a lead compound to place a drug to the market	[SW1] Assessment of factual knowledge
K6_U02	The student knows the basic issues of modern drug synthesis. The student is able to design a synthetic path for an organic compound.	[SU3] Assessment of ability to use knowledge gained from the subject
K6_W02	The student can propose a mechanism for the interaction of biologically active organic compound with its molecular target. The student can propose an organic compound structure with the potential for binding molecular targets.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation

<table>
<tr><td>Subject contents</td><td>What is the medicine? Intermolecular interactions. Drug classification. Drug names. The role of organic synthesis in the design and development of drugs. Structural features affecting the degree of difficulty in the synthesis of biologically active compounds. A synthetic approach in the creation of biologically active compounds. Retrosynthetic analysis. Disconnections of C-C bond. Transformation of functional groups, umpolung, disconnections of the C-heteroatom bond, disconnections of the C=C bond, examples of synthons and their corresponding reagents. Protective groups and latent functional groups. Cyclic systems in the synthesis of drugs. The importance of cyclic systems. Carbocycles and heterocycles. Strategy for the synthesis of cyclic systems. Intramolecular cyclization. Intermolecular cyclization. Coupling reactions combined with cyclization reactions. Baldwin rules. Chirality in the synthesis of biologically active compounds. The importance of chirality for the pharmaceutical industry. Resolution of racemic mixtures. Asymmetric synthesis. Solid phase synthesis. Parallel synthesis. Combinatorial synthesis. Synthesis of lead molecules. Characterization of the lead molecule. Lead compounds scaffold. Synthesis of libraries of chemical compounds. Click chemistry in the synthesis of lead molecules. Analogue synthesis of lead molecules. SAR testing and pharmacophore identification. Simplifying the structure of the lead molecule. Optimization of the drug structure. Total synthesis. Synthesis of natural products and their analogues. Isolation from natural sources. Semi-synthetic methods and total synthesis. Tissue cultures and genetic engineering. Analogues of natural products. Production of medicines on an industrial scale. Research and development of drug synthesis route. Optimization of the conditions of the drug synthesis process. Synthesis of isotope-labeled compounds. Isotopes used in labeling of molecules. Introduction of hydrogen and carbon isotopes. Drugs containing stable and radioactive isotopes. Selected issues in medical chemistry. Drugs affecting the cholinergic system. Drugs affecting the adrenergic system. Narcotic analgesics. Anti-ulcer drugs. Drugs affecting the cardiovascular system</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Organic chemistry and elements of Biochemistry are required.</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>Test I</td><td>60.0%</td><td>33.0%</td></tr>
<tr><td>Test II</td><td>60.0%</td><td>33.0%</td></tr>
<tr><td>Test III</td><td>60.0%</td><td>34.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>"Chemia Medyczna. Podstawowe zagadnienia" G.L. Patrick. Wydawnictwa Naukowo-Techniczne. Warszawa 2005

"An itroduction to medicinal chemistry" G.L. Patrick. Oxford University Press. Nowy Jork 2017

An introduction to drug synthesis, G.L. Patrick. Oxford University Press. Nowy Jork 2015</td></tr>
<tr><td>Supplementary literature</td><td>"Wybrane zagadnienia z metod poszukiwania i otrzymywania środków leczniczych" Pod redakcją Katarzyny Kieć-Kononowicz. Wydawnictwo Uniwersytetu Jagiellońskiego. Kraków 2006</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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