



## Subject card

Subject name and code	Chemistry and Technology of Bioactive Compounds, PG_00037435						
Field of study	Biotechnology						
Date of commencement of studies	October 2020	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	4	Language of instruction			Polish		
Semester of study	7	ECTS credits			4.0		
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		5.0		50.0	100
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 basic issues of modern drug synthesis. The student is able to design a synthetic path for an organic compound			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	K6_U02	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			[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
Subject contents	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						

Prerequisites and co-requisites	Organic chemistry and elements of Biochemistry are required.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test I	60.0%	33.0%
	Test II	60.0%	33.0%
	Test III	60.0%	34.0%
Recommended reading	Basic literature	<p>"Chemia Medyczna. Podstawowe zagadnienia" G.L. Patrick. Wydawnictwa Naukowo-Techniczne. Warszawa 2005</p> <p>"An introduction to medicinal chemistry" G.L. Patrick. Oxford University Press. Nowy Jork 2017</p> <p>An introduction to drug synthesis, G.L. Patrick. Oxford University Press. Nowy Jork 2015</p>	
	Supplementary literature	"Wybrane zagadnienia z metod poszukiwania i otrzymywania środków leczniczych" Pod redakcją Katarzyny Kieć-Kononowicz. Wydawnictwo Uniwersytetu Jagiellońskiego. Kraków 2006	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		