



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		

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	"Chemia Medyczna. Podstawowe zagadnienia" G.L. Patrick. Wydawnictwa Naukowo-Techniczne. Warszawa 2005 "An introduction 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	
	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		