



## Subject card

Subject name and code	Smart Biopharmaceuticals, PG_00058280						
Field of study	Biotechnology						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
Education level	second-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	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
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		prof. dr hab. inż. Sławomir Milewski				
	Teachers		prof. dr hab. inż. Sławomir Milewski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	15.0	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		2.0		18.0	50
Subject objectives	This course is a source of knowledge on modern second generation biopharmaceuticals exhibiting high selectivity due to the presence of fragments responsible for the targeted action of an active component.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U04] is able to predict potential properties of biomolecules and biologically active compounds on the basis of knowledge of their chemical structure and apply methods of molecular modelling of biomolecules		1. Student is able to identify structural features of a given biopharmaceutic conditioning its biological properties. 2. Student indicates alternative possibilities of modification of structure of a given biopharmaceutic towards changing a particular biological property.		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K7_K02] is aware of the limitations and the necessity of continuous development of knowledge and technology; understands the need for education and constant training		Students, working in groups, analyze the state of knowledge about specific biopharmaceuticals and present the result of this analysis in a synthetic way.		[SK1] Assessment of group work skills [SK2] Assessment of progress of work		
	[K7_U10] is able to use knowledge about possibilities, aims and limitations of biotechnology to develop, design and obtain products and biotechnological processes in the area of his/her specialization		The student has acquired knowledge at an advanced level regarding the possibilities of designing structures of second-generation biopharmautics and their production using biotechnological methods.		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	[K7_W06] has knowledge about modern forms of drugs, including drugs of plant origin, new generation vaccines, alternative forms of therapy based on phages, knows issues related to biological activity of plant chemicals, knows how to test new drugs and how to introduce them to the market		The student is able to give examples of second-generation biopharmaceuticals and explain the molecular basis of their targeted biological action.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		

Subject contents	1. Drug targeting - strategies and ways of execution  2. Strategies of improvement of properties, including selective toxicity of antimicrobials and anticancer drugs  3. Mechanisms of microbial drug resistance and strategies of its overcoming  4. Drug carriers - classes and applications  5. Strategies of construction of drug conjugates  6. Modern methods of construction and modification of proteinous biopharmaceuticals  7. Design and preparation of drugs based on antibodies and antibody fragments  8. Medicinal preparations based on DNA and mRNA		
Prerequisites and co-requisites	Basic knowledge on low molecular weight, proteinous and nucleic acids-based biopharmaceuticals gained during first-cycle studies.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	assessment of own presentation and activity during seminars	50.0%	40.0%
	Written tests on lecture materials	50.0%	60.0%
Recommended reading	Basic literature	D.J.A. Crommelin, R.D. Sindelar, B. Meibohm (eds). Pharmaceutical Biotechnology. Fundamentals and Applications. Fifth edition, Springer, New York, 2019	
	Supplementary literature	R.J.Y Ho and M. Gibaldi (eds.) Biotechnology and Biopharmaceuticals, John Wiley & Sons Inc., Hoboken, 2003	
	eResources addresses	Podstawowe <a href="https://www.scribd.com/document/459255962/2019-Book-PharmaceuticalBiotechnology-pdf">https://www.scribd.com/document/459255962/2019-Book-PharmaceuticalBiotechnology-pdf</a> - The pdf version of Pharmaceutical Biotechnology. Fundamentals and Applications. Fifth edition, Springer, New York, 2019 textbook Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Drug targeting - examples  2. Structural modifications of antimicrobial drugs - goals and ways to achieve them  3. Classes of drug carriers  4. Linkers used in construction of drug conjugates  5. Techniques of preparation drug:antibody conjugates  6. Modifications of oligonucleotides aimed at their protection against nucleases		
Work placement	Not applicable		