



## Subject card

Subject name and code	Biotechnology Derived Drugs, PG_00037434						
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			6.0		
Learning profile	general academic profile	Assessment form			exam		
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	dr hab. inż. Piotr Szweda prof. dr hab. inż. Sławomir Milewski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	45.0	0.0	15.0	90
	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	90	6.0		54.0	150	
Subject objectives	To make student acquainted with kinds of biopharmaceuticals, methods of their preparation, isolation and assessment of chemical and biological properties.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U02	1. Student understands the concept of biopharmaceutic, is able to determine classes and kinds of biopharmaceutics. 2. Student knows the stages of drug development			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	K6_W05	1. Student is able to design stages of the industrial manufacturing of proteinous biopharmaceutics 2. Student proposes methods of production and isolation of a low molecular weight biopharmaceutics			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		

Subject contents	<ol style="list-style-type: none"> <li>1. Pharmaceutical biotechnology - historical survey, scope, legal aspects, public perception.</li> <li>2. Microorganisms as a source of novel biologically active substances and high throughput screening methods of their discovery</li> <li>3. Preclinical and clinical studies of novel potential drugs.</li> <li>4. Knowledge of the microbial metabolism as a basis for the design of biotechnological processes.</li> <li>5. Secondary metabolic pathways and their products.</li> <li>6. Metabolic engineering; strain improvement</li> <li>7. Overproduction of primary metabolites as a basic goal of biotechnological processes.</li> <li>8. Design of biotechnological processes. Isolation and purification of products.</li> <li>9. Control and quality assurance of biotechnological processes.</li> <li>10. Production and isolation of low molecular weight secondary metabolites - antibiotics and statins</li> <li>11. Proteins as drugs <ul style="list-style-type: none"> <li>- manufacturing of therapeutic proteins</li> <li>- control and monitoring of protein production</li> <li>- formulation of protein drugs</li> <li>- strategies of immunogenicity reduction</li> <li>- examples of protein drugs</li> <li>- hybrid proteins</li> <li>- immunoglobulins in therapy</li> </ul> </li> <li>12. Nucleic acids as drugs <ul style="list-style-type: none"> <li>- antisense strategy; use of ribozymes and siRNA technology</li> <li>- technologies of oligodeoxynucleotides (ODN) production</li> <li>- gene therapy</li> <li>- formulation of DNA and RNA drugs</li> </ul> </li> <li>13. Cell and tissue cultures in pharmaceutical biotechnology</li> <li>14. Vaccine production</li> <li>15. Construction of artificial tissues with the use of biopolymers and controlled drug release systems.</li> </ol>		
Prerequisites and co-requisites	Knowledge of the basic aspects of general and industrial microbiology, organic chemistry, biochemistry, molecular biology and genetic engineering.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	100.0%
Recommended reading	Basic literature	Biotechnologia farmaceutyczna, pod red. O. Kaysera i R. H. Müllera, PZWL, Warszawa 2004 O. Kayser, Podstawy Biotechnologii Farmaceutycznej, Wydawnictwo UJ, Kraków 2006	
	Supplementary literature	Podstawy Biotechnologii, C. Ratledge i B. Kristiansena (ed.), PWN, Warszawa 2011	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Biosimilars and biobetters</li> <li>2. The major pathways of secondary metabolism</li> <li>3. Streptomyces as a source of low molecular weight biopharmaceutics</li> <li>4. The stages of antibiotic production and isolation</li> <li>5. Basic strategies of metabolic engineering</li> <li>6. Classes of proteinous biopharmaceutics</li> <li>7. Techniques of obtaining monoclonal antibodies</li> <li>8. Construction of therapeutic protein:antibody conjugates</li> <li>9. Antisense strategies</li> <li>10. Preparation of oligonucleotides</li> </ol>		
Work placement	Not applicable		