



Subject card

Subject name and code	Instrumental Methods of Biomolecules Structure and Activity Measurements, PG_00048904						
Field of study	Biotechnology						
Date of commencement of studies	February 2022	Academic year of realisation of subject	2021/2022				
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study 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	1	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	prof. dr hab. inż. Sławomir Milewski					
	Teachers	prof. dr hab. inż. Sławomir Milewski dr inż. Andrzej Skwarecki dr hab. inż. Piotr Bruździak dr inż. Kamila Rząd dr hab. inż. Rafał Piątek dr inż. Paweł Kubica					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
	Instrumentalne metody badania struktury i aktywności biomolekuł - Moodle ID: 23531 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23531						
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	12.0	33.0	75		
Subject objectives	Making students familiar with practical aspects of modern instrumental methods application in studies on biomolecules						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_U05	Student is able to determine the conditions for antibiotic purification by HPLC and for protein purification by FPLC. Student is familiar with methods of running calorimetric experiments, spectrophotometric measurements and MS and NMR experiments	[SU4] Assessment of ability to use methods and tools
	K7_K04	Student is able to define the timetable of task execution, execute it as a group member, elaborate the results and discuss them.	[SK3] Assessment of ability to organize work
	K7_W06	Student knows possibilities of using medium pressure chromatographic techniques for purification of biomacromolecules. Student is familiar with the rules of choice of a spectroscopic technique for determination of structure and activity of biomolecules and is able to apply these rules in practice	[SW1] Assessment of factual knowledge
	K7_W05	Student is able to draw conclusions concerning structure of investigated biomolecules based on the results of their instrumental analysis.	[SW3] Assessment of knowledge contained in written work and projects
K7_U12	Student uses English-language scientific literature for preparing reports on results of experimental work	[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information	
Subject contents	<ol style="list-style-type: none"> 1. Analysis of kinetics of protein denaturation by means of differential scanning calorimetry 2. Use of FPLC for isolation and characterisation of biomacromolecules 3. Application of HPLC for isolation of substances of natural origin and examination of antibiotics purity 4. Determination of protein molecular mass by MS-ESI 5. FTIR spectroscopy in examination of protein secondary structure 6. Determination of structure and activity of biomolecules by NMR 7. Examination of biological membranes and transmembrane transport by spectrofluorimetry 8. Spectrofluorimetric determination of kinetic parameters of protein:ligand interaction 9. Differential UV/vis spectroscopy in DNA:ligand interaction studies 10. Application of surface plasmon resonance in biological studies 		
Prerequisites and co-requisites	Knowledge of Biochemistry, Methods of Structural Studies and Separation Technologies at the 1st level studies		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Assessment of theory knowledge	50.0%	30.0%
	Report	50.0%	50.0%
	Practical exercises	100.0%	20.0%

Recommended reading	Basic literature	Materials available at the WWW page "Instrumentalne metody badania struktury i aktywności biomolekuł", S. Milewski (red), Wydawnictwo PG 2013
	Supplementary literature	Alan Cooper, Chemia biofizyczna, PWN W-wa, 2010
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>1. List ionisation techniques used in mass spectrometry</p> <p>2. What absorption bands in UV region are characteristic for proteins?</p> <p>3. Which features of medium-pressure liquid chromatography (FPLC) are crucial for the usefulness of this technique for biomolecules separation?</p>	
Work placement	Not applicable	