

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	Instrumental Techniques for the Analysis of Biomolecules, PG_00058417							
Field of study	Biotechnology							
Date of commencement of studies	October 2023		Academic year of realisation of subject		2023/2024			
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	2		ECTS credits		2.0			
Learning profile	general academic profile		Assessmer	essment 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. Kamila Rząd					
			dr inż. Karolina Matejczuk					
			dr inż. Agata Sommer					
			dr inż. Andrzej Skwarecki					
			dr hab. inż. Piotr Bruździak					
			dr hab. inż. Rafał Piątek					
			dr hah inż Weronika Hewelt-Belka					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	t	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0		0.0	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		5.0		15.0		50
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_U07] is able to consider bioethical issues and regulations in research planning and design of biotechnological products and processes	Student is able to plan an experiment taking into account bioethic regulations.	[SU2] Assessment of ability to analyse information			
	[K7_U05] is able to apply instrumental methods of quantitative and qualitative analysis and studies on activity of biomolecules, select and apply diagnostic and analytical methods in the field of his/her specialty with particular emphasis on genetic, molecular and microbiological diagnostics and diagnostics based on antigen-antibody reaction	Student is able to determine the conditions of antibiotic purification by HPLC and protein isolation by FPLC. Student knows the rules of performing the calorimetric experiments, spectrophotometric measurements and MS and NMR determinations.	[SU4] Assessment of ability to use methods and tools			
	[K7_W02] has advanced knowledge of structure and activity of enzymes and biologically active compounds also in pharmacological context, knows basic instrumental methods of qualitative and quantitative analysis and activity studies of biomolecules	Student knows the rules and possibilities of application of methods of instrumental analysis of biomolecules	[SW1] Assessment of factual knowledge			
	[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	Student is able to determine the physicochemical and sructural parameters of biomolecules on the basis of spectral determinations	[SU4] Assessment of ability to use methods and tools			
	[K7_K04] is aware of the need to solve problems and perform tasks, independently formulate questions to solve a given problem or task; is able to plan the execution of a larger task by dividing it into partial tasks and draw up an appropriate schedule	Student is able to determine the time schedule of task performance, execute these tasks as a team member, work out the results obtained and discuss them.	[SK3] Assessment of ability to organize work			
Subject contents	1. Analysis od 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 spectroflurimetry					
	8. Spectroflurimetric determination of kinetic parameters of protein:ligand interaction					
	9. Differential UV/vis spectroscopy in DNA:ligand interaction studies					
Prerequisites and co-requisites	Knowledge of Biochemistry, Methods studies	s of Structural Studies and Separatio	n Technologies at the 1st level			

Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	Assessment of theory knowledge	50.0%	30.0%			
	Report	50.0%	50.0%			
	Practical excercises	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	Adresy na platformie eNauczanie: Techniki Instrumentalne w Analizie Biocząsteczek - Moodle ID: 37207 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37207				
Example issues/ example questions/ tasks being completed	1. List ionisation techniques used in mass spectrometry					
	2. What absorption bands in UV region are characteristic for proteins?					
	3. Which features of medium-pressure liquid chromatography (FPLC) are crucial for the usefulness of this technique for biomolecules separation?					
Work placement	Not applicable					

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