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 2022	Academic year of realisation of subject	2022/2023
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	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. Szymon Mania dr hab. inż. Dorota Martysiak-Żurowska dr inż. Kamila Rząd dr hab. inż. Hanna Staroszczyk dr hab. inż. Robert Tylingo dr inż. Agata Sommer dr inż. Andrzej Skwarecki dr hab. inż. Piotr Bruździak dr hab. inż. Rafał Piątek dr inż. Weronika Hewelt-Belka	

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						

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_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
	[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_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_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_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

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 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
	Practical excercises	100.0%	20.0%
	Report	50.0%	50.0%
	Assessment of theory knowledge	50.0%	30.0%
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:	
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		