GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	INSTRUMENTAL TECHNIQUES FOR THE ANALYSIS OF BIOMOLECULES, PG_00063456		
Field of study	Biotechnology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Piotr Szweda	
	Teachers		

Lesson types

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_U04] predicts the interaction of biomolecules and biologically active compounds on living organisms and the course of processes involving them based on knowledge in biology, biotechnology and related fields and computer methods of data analysis, modeling and simulation	The student is able to determine physicochemical and structural parameters of biomolecules based on the results of spectral analysis.	[SU2] Assessment of ability to analyse information
[K7_W02] explains the structure and function of biomolecules and the methods and instruments for determining their quantity and activity	The student knows the principles and possibilities of using methods of instrumental analysis of biomolecules	[SW1] Assessment of factual knowledge
[K7_U01] designs experiments in accordance with the state of the art and the latest scientific literature, using computer methods of data analysis, computer simulations	The student knows the theoretical basis of experimental techniques used for purification of natural compounds. The student is able to plan an experiment and interpret its results.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	Course content – laboratory **The students of all specializations** 1. UV spectroscopy in biomolecule studies 2. Application of FPLC for isolation and characterization of biomacromolecules 3. Application of spectrofluorimetry for investigation of protein:ligand interaction **The students of specialization: Pharmaceutical Biotechnology and Molecular Biotechnology** 4. Study of biological membranes and transport through membranes using spectrofluorimetry 5. Determination of the structure and activity of biomolecules using NMR spectroscopy 6. Application of confocal microscopy in biomolecule studies 7. Study of the biological activity of biomolecules using flow cytometry 8. Application of RT-PCR technique for nucleic acid amplification **The students of specialization: Technology, biotechnology and food analysis** 4. Viscometric determination of viscosity 5. Instrumental analysis of texture and mechanical strength of polysaccharide-protein systems 6. Determination of temperature of starch gelatinization by differential scanning calorimetry 7. Determination of cocoa butter polymorphism by differential scanning calorimetry 8. Potentiometric determination of enzyme activity
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 biomoleku", 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	1. What fluorescent dyes are used in the RT-PCR technique? 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?

Practical activites within the subject	Not applicable

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