

Subject card

Subject name and code	Techniques of analysis of biomolecules, PG_00082041						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		2.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Laboratory of Medical Chemistry -> Department of Biomedical Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Aneta Szymańska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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	To acquaint students with chemical methods and instrumental techniques used in the analysis of biomolecules along with their theoretical foundations. To acquaint students with general and characteristic reactions of individual groups of biomolecules. Preparing students for independent planning of experiments and conducting qualitative and quantitative analysis for individual types of biomolecules based on characteristic reactions and physicochemical (including spectral) properties. Improving the ability to select a method and critically evaluate the results of the analysis.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	student plans and performs analyses of biomolecules using experimental and instrumental methods and next analyses the obtained results	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU6] demonstration of practical skills
	[CHEML3_U04] Plans and performs simple chemical experiments and analyses the results obtained.	student selects appropriate equipment and laboratory apparatus to perform uncomplicated chemical experiments, carry them out, and then analyse the results obtained	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU6] demonstration of practical skills
	[CHEML3_U09] Is able to learn independently.	student independently prepares for the final exam using the sources available to him/her	[SU4] test/exam - oral or written
	[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	student describes the properties of the basic groups of biomolecules, lists the methods of their analysis	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
	[CHEML3_K08] Formulates opinions in the field of science with caution and criticism in their expression.	student draws conclusions from the information presented during the lecture, analyses them basing on the acquired knowledge and expresses them during discussion and the exam	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	student characterizes the basic methods of biomolecule analysis	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
	[CHEML3_K03] Establishes priorities in the right way for the implementation of tasks specified by herself/himself and/or by others.	student, alone or in agreement with the group, plans the sequence of activities to be performed, taking into account the number of tasks, the amount of time necessary for their successful accomplishment and the final aim of the task	[SK2] presentation/project/paper/report [SK5] implementation of a problem task
Subject contents	[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.		
	student, during laboratory class, obeys the established safety procedures, is responsible for the safety of his own work and that of other participants of the class		
Subject contents	A. Problems of the lecture: - Characterization of physicochemical properties of different types of biomolecules. - General and characteristic reactions of the different groups of biomolecules. - Methods of quantitative analysis of different groups of biomolecules. - Application of chromatographic methods for analysis. - Application of electrophoretic techniques for the analysis of proteins and nucleic acids. - Basics and application of spectroscopic methods for the analysis of biomolecules. B. Laboratory problems: - Isolation of selected groups of biomolecules (proteins, nucleic acids, sugars) from biological material. - Qualitative and quantitative analysis of specific groups of biomolecules (amino acids, proteins, nucleic acids, sugars, lipids, vitamins, steroids) by methods specific (selected on the basis of physicochemical characteristics and/or used as standard) for the biomolecule group under study. - Analysis of the composition of an unknown mixture containing compounds belonging to the studied group of biomolecules using characteristic reactions and techniques based on physicochemical characteristics of representatives of this group of chemical compounds. - Presentation of the results obtained during the performance of experiments on the analysis of the studied group of biomolecules, combined with their discussion, prepared in the form of a written report.		
	completed courses: Analytical Chemistry, Organic chemistry		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final exam	51.0%	100.0%
Recommended reading	Basic literature	1. A. Weissberg (red.) Analytical Biochemistry, Stany Zjednoczone: Syrawood Publishing House, 2016 2. S.R. Mikkelsen, E. Cortón: Bioanalytical Chemistry, Wielka Brytania: Wiley, 2016 3. J. Carol (red): Textbook of Analytical Biochemistry, Stany Zjednoczone: Syrawood Publishing House, 2016 4. M. Basha: Analytical Techniques in Biochemistry. Niemcy: Humana Press, 2019	
	Supplementary literature	1. Hames B. D., Hooper N. M., Houghton J. D. Krótkie wykłady: Biochemia; Wydawnictwo Naukowe PWN, Warszawa 2002. 2. Stryer L. Biochemia; Wydawnictwo Naukowe PWN, Warszawa 2000	
	eResources addresses		

Example issues/ example questions/ tasks being completed	- Characteristic reactions of amino acids - Methods for the determination of protein concentrations - Characteristic reactions of sugars - Differentiation of reducing/non-reducing sugars, aldoses/ketoses. pentoses/hexoses - Determination of lipid characteristic values/numbers (e.g. saponification, acid, iodine)
Work placement	Not applicable

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