University of Gdańsk

Subject card

Subject name and code	Techniques of analysis of biomolecules, PG_00082042		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group 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 Polish
Semester of study	5	ECTS credits	3.0
Learning profile	academic	Assessment form	credit
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	0.0	0.0	45.0	0.0	0.0	45

E-learning hours included: 0.0

Additional information:

Independent performance of chemical experiments by students based on prepared instructions.

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	45	8.0	22.0	75

Subject objectives

To familiarise students with the chemical methods and instrumental techniques standardly used in the analysis of biomolecules together with their theoretical basis. To familiarise students with the general and characteristic reactions of specific groups of biomolecules. To prepare students to independently plan experiments and conduct qualitative and quantitative analysis for specific types of biomolecules. To refine skills in method selection and critical evaluation of analytical results. To refine the ability to present laboratory results. To refine the ability to work in a group.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_K03] Establishes priorities in the right way for the implementation of tasks specified by herself/himself and/or by others.	the student, alone or in agreement with the group, plans the sequence of activities to be performed during the laboratory, taking into account the number of experiments, their time consumption and the final aim of the task	[SK2] presentation/project/paper/ report [SK5] implementation of a problem task
[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_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_U04] Plans and performs simple chemical experiments and analyses the results obtained.	the 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_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	student obeys the established safety procedures during laboratory work, is responsible for the safety of his own work and that of other participants of the class	[SK8] observation of student's independent or team work
[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_K08] Formulates opinions in the field of science with caution and criticism in their expression.	student draws conclusions from the experiments carried out and critically evaluates and analyses them, and presents them in the form of a report	[SK1] oral statement/conversation/ discussion [SK2] presentation/project/paper/ report
[CHEML3_U09] Is able to learn independently.	student independently prepares himself/herself to perform the tasks planned for the class, using the available resources	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written

Subject contents

Isolation of selected groups of biomolecules (proteins, nucleic acids, sugars) from biological material. Qualitative and quantitative analysis of individual groups of biomolecules (amino acids, proteins, nucleic acids, sugars, lipids, vitamins, steroids) using appropriate methods (selected on the basis of physicochemical characteristics and/or used as standard). 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.

Prerequisites and co-requisites

completed courses: "Analytical Chemistry", "Organic Chemistry".

knowledge of the basic groups of organic compounds classified on the basis of functional group, knowledge of the basic types of biomolecules, knowledge of basic laboratory analytical techniques, ability to work with basic chemical reagents, (organic and inorganic) used routinely in a chemical laboratory

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written presentation (report) of the results obtained, combined with their critical analysis and discussion	51.0%	40.0%
Quality and organisation of the work during performing the planned chemical experiments	51.0%	30.0%
An introductory test, covering information on the physico-chemical characteristics of the group of biomolecules to be analysed, general and characteristic reactions and basic laboratory technique	51.0%	30.0%

Recommended reading

Basic literature	1. Monographic materials (instructions) prepared by instructors 2. L. Kołyszejko-Stefanowicz (red.): Ćwiczenia z biochemii, Wydawnictwo Naukowe PWN, 2003

	Supplementary literature	1. B.D. Hames., N.M. Hooper, J.D. Houghton: Krótkie wykłady: Biochemia; Wydawnictwo Naukowe PWN, Warszawa 2002. 2. L. Stryer" 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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