


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


Course title		ECTS code	
Techniques of analysis of biomolecules		13.3.0977	
Name of unit administrating study			
Faculty of Chemistry			
Studies			
faculty	field of study	type	pierwszego stopnia
Wydział Chemii	Chemia	form	stacjonarne
		specjalty	analityka i diagnostyka chemiczna
		specialization	wszystkie
Teaching staff			
dr hab. Aneta Szymańska, profesor uczelni; dr hab. Magdalena Wysocka, profesor uczelni; dr Marta Orlikowska; dr Ewa Wiczerzak; dr Marta Spodzieja; dr hab. Elżbieta Jankowska, profesor uczelni			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		5	
Laboratory classes, Lecture		classes - 75 h	
The realization of activities		tutorial classes – 10 h	
classroom instruction		student's own work – 40 h	
Number of hours		Total: 125 h - 5 ECTS	
Lecture: 30 hours, Laboratory classes: 45 hours			
The academic cycle			
2024/2025 winter semester			
Type of course		Language of instruction	
obligatory		polish	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
- conducting experiments - multimedia-based lecture		Final evaluation	
		- Graded credit - Examination	
		Assessment methods	
		- written exam with open questions - written exam (test) - graded course credit based on individual grades obtained during the semester	
		The basic criteria for evaluation	
		A) Lecture - providing a correct answer to at least half (51%) of the questions and test tasks presented B) Laboratory exercises - obtaining positive scores for: 1) preliminary tests, preceding blocks of chemical experiments in the field covering the physicochemical characteristics of the analyzed group of biomolecules, general and characteristic reactions as well as basic laboratory techniques used in the analysis of selected group of biomolecules; 2) the quality and organization of work in conducting planned blocks of chemical experiments on the group of biomolecules under study; 3) a written presentation of the obtained results, combined with their analysis, presented in the form of a written report	
Method of verifying required learning outcomes			
Required courses and introductory requirements			
A. Formal requirements			

- completed courses: "Analytical chemistry", "Organic chemistry"

B. Prerequisites

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

Aims of education

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. Improving the ability to present the results of laboratory work.

Course contents

A. Topics of the lecture:

Characteristics of the physicochemical properties of individual types of biomolecules. General and characteristic reactions of particular groups of biomolecules. Methods of quantitative analysis of individual groups of biomolecules. Application of chromatographic methods for analysis. Application of electrophoretic techniques to the analysis of proteins and nucleic acids. Basics and application of spectroscopic methods for the analysis of biomolecules.

B. Laboratory issues:

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) with the use of characteristic methods (selected on the basis of physicochemical characteristics and / or standard methods) for the studied group of biomolecules. Analysis of the composition of an unknown mixture containing compounds belonging to the studied group of biomolecules using characteristic reactions and techniques based on the physicochemical characteristics of representatives of this group of chemical compounds. Presentation of the results obtained during the experiments concerning the analysis of the studied group of biomolecules, combined with their discussion, prepared in the form of a written report.

Bibliography of literature

A. Literature required for the final completion of the course (passing the exam):

A.1. used during classes: - monographic materials prepared by the lecturers

A.2. studied independently by the student:

-Kołyszejko-Stefanowicz L. (red.): Ćwiczenia z biochemii, Wydawnictwo Naukowe PWN, 2003

B. Supplementary literature

- Hames B. D., Hooper N. M., Houghton J. D. Krótkie wykłady: Biochemia; Wydawnictwo Naukowe PWN, Warszawa 2002.

- Stryer L. Biochemia; Wydawnictwo Naukowe PWN, Warszawa 2000.

The learning outcomes (for the field of study and specialization)

Knowledge

- student has basic knowledge of the studied chemical specialty;
- student describes the properties of the basic groups of biomolecules, lists the methods of their analysis;
- student characterizes the basic methods of biomolecule analysis;
- student explains the relationships between the structure of a biomolecule and its observed properties;
- student lists and describes the basic aspects of the construction, operation and application of the measuring apparatus and equipment used for the analysis of biomolecules;

Skills

- student identifies, analyzes and solves problems in the field of broadly understood chemistry based on the acquired knowledge;
- student performs the analysis of biomolecules with the use of experimental methods and formulates conclusions based on them;
- student selects the appropriate equipment and laboratory apparatus to carry out simple chemical experiments
- student plans and performs simple chemical experiments and analyzes the obtained results;
- student prepares a documented study of a specific problem in the field of selected chemical and physical issues;

Social competence

- student identifies the level of his/her knowledge and skills, the need for continuous

training and personal development;

- student works individually, demonstrating the initiative and independence of action and cooperates in a team taking various roles in it;
- student follows established procedures in laboratory work and is responsible for the safety of his/her work as well as the others;
- student improves his/her professional and personal competences through the use of information provided in various sources;
- student formulates opinions in the field of exact sciences with caution and criticism in expressing them;

Contact

aneta.szymanska@ug.edu.pl