

Course title Biochemia / Biochemistry		ECTS code 13.3.0968	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Chemistry	Bachelor	Full-time studies	
Teaching staff Prof. dr hab. Krzysztof Rolka			
Forms of classes, the realization and number of hours		ECTS credits 4	
A. Forms of classes, in accordance with the UG Rector’s regulations lecture, auditorium classes, laboratory classes		classes - 60 h tutorial classes – 10 h student’s own work – 30 h	
B. The realization of activities in-class learning		Total: 100 h - 4 ECTS	
C. Number of hours 60 h (30 h lecture, 15 h auditorium classes, 15 h laboratory classes)			
The academic cycle Second year, summer semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods Lecture with multimedia presentation Problem-solving tutorials Laboratory experiments		Form and method of assessment and basic criteria for evaluation or examination requirements	
		A. Final evaluation, in accordance with the UG study regulations lecture – exam auditorium classes – course completion (with a grade) laboratory classes – course completion (with a grade)	
		B. Assessment methods - Written exam with open questions	
		C. The basic criteria for evaluation or exam requirements • positive grade received in written exam composed of 5-10 open questions covering issues listed in the course contents; answers to these questions will require solving tasks specified in educational outcomes; the grading scale would be adjusted to the range of all rated exams • to take the exam both the laboratory classes and <i>tutorials</i> must be passed; <i>Tutorials:</i> • passing two written colloquiums covering: (1) chemical structures and properties of amino acids, peptides and proteins (2) chemical structure and properties of monosaccharides, polysaccharides, lipids, cell membranes and nucleic acids; • each negative grade should be improved at repeat colloquium. Laboratory classes: • positive grade received in 3 preliminary testes, that check knowledge required to perform experiments during the classes; accomplishment of all planned experimental work (quality of laboratory work, ability to team work and mode of work would be graded); analysis of obtained results performed as written report; • to complete the laboratory course each negative grade must be improved.	
Required courses and introductory requirements Organic chemistry (bachelor level)			

Fundamentals of organic chemistry, skills to work in a chemical laboratory, knowledge of basic laboratory glassware, learning the principles of work in a biochemical laboratory

Aims of education

- to acquaint students with all issues mentioned in the lecture contents;
- to introduce students to the basic endogenous organic compounds, their structure and functions;
- to acquaint students with basic metabolic pathways and relations between them;
- to teach students how to perform biochemical experiments using delivered instructions;
- to develop the ability to critically assess and interpret obtained experimental results and analysis of scientific sources;

A. Lecture: Energy-rich compounds, thermodynamics of biochemical reactions. Classification, structures and functions of enzymes. Mechanisms of enzyme catalysis. Carbohydrates, lipids and proteins – structures and functions. Biological membranes – structure and functions. Metabolic pathways: glycolysis, gluconeogenesis, pyruvate decarboxylation, Krebs cycle, oxidative phosphorylation, glycogen metabolism, fatty acids metabolism, amino acids metabolism, pentose phosphate pathway. Proteins and signal transduction. Photosynthesis. DNA and RNA: replication, transcription, translation, PCR. Basics of genetic engineering.

B. Tutorial: Chemical structure, physicochemical properties and biological functions of peptides, proteins, nucleic acids, phospholipids, mono- and polysaccharides.

C. The lab: completion of five experiments with the following topics: determination of activity of serine proteinases and their inhibitors using chromogenic substrates, determination of kinetic parameters of selected chromogenic substrate, separation of proteins by size-exclusion chromatography, phospholipid analysis by thin layer chromatography, determination of polysaccharides susceptibility to hydrolysis in low pH

Bibliography of literature

A. Literature required to pass the course

J. M. Berg, J. L. Tymoczko, L. Stryer, „Biochemia”, PWN, Warszawa 2009
 Monographic works provided by assistants leading classes

B. Extracurricular readings

Various academic handbooks concerning biochemistry

Knowledge

1. Defines and demonstrates chemical structure of basic groups of bio- and macromolecules;
2. Describes and illustrates main metabolic pathways using chemical reactions, explains their importance for the body functioning;
3. Characterizes basic analytical methods of endogenous, organic compounds;
4. Characterizes methods of determination of enzymatic activity of selected proteases;
5. Recognizes basic laboratory equipment;
6. Understands influence of diet on physical condition of the body;

Skills

1. Uses chemical terminology necessary to present (both in oral and written form) the content presented in the course;
2. Has the ability to predict the course and products of metabolic pathways ;
3. Predicts physicochemical and biological properties of organic compounds based on their chemical formulas;
4. Uses the basic analytical techniques applied for the analysis of endogenous organic compounds;
5. Designs and performs simple biochemical experiments, using appropriate laboratory equipment;
6. Analyzes the results of performed experiments, draws conclusions about the correctness of their course;

Social competence

1. Understands the need of continuous education;
2. Takes care of laboratory equipment;
3. Carefully uses laboratory equipment and works cautiously with chemicals;
4. Appreciates the need of ability to team work according to assigned role (team leader/team member);
5. Is aware of the need of critical analysis of own work;
6. Shows cautious criticism when acquiring knowledge, especially these coming from mass media;
7. Is aware of the necessity of fair and reliable work;