

# Biochemistry - course description

General information	
Course name	Biochemistry
Course ID	13.6-WB-OS2P-B-ch-S17
Faculty	<a href="#">Faculty of Biological Sciences</a>
Field of study	Environmental Protection
Education profile	academic
Level of studies	First-cycle studies leading to Bachelor's degree
Beginning semester	winter term 2021/2022

Course information	
Semester	3
ECTS credits to win	7
Course type	obligatory
Teaching language	english
Author of syllabus	<ul style="list-style-type: none"><li>prof. dr hab. Aleksander Sikorski</li><li>dr hab. inż. Dżamila Bogusławska, prof. UZ</li></ul>

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	35	2,33	-	-	Exam
Laboratory	45	3	-	-	Credit with grade

## Aim of the course

Getting to know and understand the chemical basis of the structure and function of the body.

## Prerequisites

The basic knowledge of inorganic and organic chemistry and biophysics.

## Scope

**Lecture** Biochemistry - clarifying concepts and content. Amino acids and proteins. Peptide bond. Proteins - structure, classification, and the complexity of the structural and functional diversity. The parameters characterizing the properties of the proteins. Enzymes - basic functions. Enzyme inhibitors. Nucleic acids - structure, diversity, function, biosynthesis. The genetic code. Biosynthesis of proteins. Sugars - structure and function in the body. Lipids - complexity and classification, biosynthesis and catabolism of certain lipids. Vitamins - the characteristics and distribution of vitamins. Metabolism of basic concepts. Anabolic and catabolic processes. Coupled reactions. Glycolysis. Krebs cycle. Photosynthesis. Oxidative phosphorylation. Inputs of nitrogen to the biosphere. Chromatographic techniques. Electrophoresis. Basics of spectrophotometry.

**Laboratory** To acquaint students with the research apparatus used in the biochemical laboratory. Service, maintenance. Discussion of principles regarding the preparation of biochemical reagents. Biochemical calculations. Qualitative and quantitative analysis of carbohydrates. Identification of unknown sugar. Qualitative and quantitative analysis of specific fats. The reaction of saponification of specific fats. Fat numbers. Preparation and analysis of lecithin from egg yolks. Qualitative and quantitative analysis of vitamins. Characteristic reactions of amino acids. Reactions characteristic for selected amino acids. Identification of an unknown amino acid. Quality analysis of proteins. Protein properties in solution. Sacking of egg protein (separation of albumin from globulins). Protein denaturation. Quantitative analysis of proteins. Spectrophotometric analysis. Enzymatic reaction. Inhibitors and activators. Determination of activity and detection of selected enzymes. Acid hydrolysis of nucleic acids. DNA and RNA isolation. Quality analysis of nucleic acids. Pentose detection. Detection of purine and pyrimidine bases. Detection of orthophosphoric acid (V). DNA electrophoresis in agarose gel. Quantitative analysis of nucleic acids. Determination of purity of nucleic acid preparations.

## Teaching methods

**Lecture:** giving method - lecture in the form of a multimedia presentation in the classroom;

**Laboratory:** giving method: discussion on the application of analytical methods; Practical method: lab exercises with the use of selected: biochemical methods, methods for documenting the results and bioinformatics programs.

## Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
student explains the basics of molecular variation and evolution of organisms and the global importance of certain metabolic processes, such as photosynthesis, the assimilation of molecular nitrogen to the biosphere.	<ul style="list-style-type: none"><li><a href="#">K1A_W06</a></li></ul>	<ul style="list-style-type: none"><li>an evaluation test</li><li>an exam - oral, descriptive, test and other</li></ul>	<ul style="list-style-type: none"><li>Lecture</li><li>Laboratory</li></ul>

Outcome description	Outcome symbols	Methods of verification	The class form
student solves simple problems in the field of biochemistry and molecular biology, prepares reports from performed laboratory experiments, uses basic laboratory equipment (pipettes, electrophoresis equipment and chromatography, spectrophotometers, pH meters, etc.), conduct experiments according to the procedures.	<ul style="list-style-type: none"> <li>• <a href="#">K1A_W04</a></li> <li>• <a href="#">K1A_W05</a></li> <li>• <a href="#">K1A_U03</a></li> </ul>	<ul style="list-style-type: none"> <li>• activity during the classes</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory</li> </ul>
student working in a group and organize the work in a particular experiment, listens to comments of the teacher and apply its	<ul style="list-style-type: none"> <li>• <a href="#">K1A_K01</a></li> <li>• <a href="#">K1A_K30</a></li> </ul>	<ul style="list-style-type: none"> <li>• activity during the classes</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory</li> </ul>
student applies the method of self-study and understand that they possess the knowledge and experience gained in this field is essential for the reliable implementation of the biological experiments	<ul style="list-style-type: none"> <li>• <a href="#">K1A_K03</a></li> </ul>	<ul style="list-style-type: none"> <li>• carrying out laboratory reports</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory</li> </ul>
student explains the molecular basis of the functioning of a living organism, especially functions of the cell	<ul style="list-style-type: none"> <li>• <a href="#">K1A_K05</a></li> </ul>	<ul style="list-style-type: none"> <li>• an exam - oral, descriptive, test and other</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Laboratory</li> </ul>

## Assignment conditions

LECTURE: provided credit is to get positive results from written examination test. Least 50% of scored points are required to get the pass mark credit.

LABORATORY: provided credit is class attendance and getting positive results of the tests (a positive mark above 50% of scored points), and credit of all written reports from performed laboratory experiments. The final mark consists of the average sum of all of the passed partial marks.

## Recommended reading

1. Berg, J.M, Tymoczko, J.L. , Stryer, L., *Biochemia*, Wydawnictwo Naukowe PWN, Warszawa, 2005, wydanie IV zmienione.
2. Berg, J.M, Tymoczko, J.L. , Stryer, L., *Biochemia*, Wydawnictwo Naukowe PWN, Warszawa, 2009, wydanie VI zmienione.

## Further reading

1. P. Kafarski & B. Lejczak, *Chemia bioorganiczna*, PWN, Warszawa, 1994.
2. J. Staniec, A. Bojarska *Ćwiczenia z biochemii dla studentów biologii*, Wydaw. Naukowe AP, Kraków, 2001
3. L. Kłyszejko-Stefanowicz *Ćwiczenia z biochemii*, PWN, Warszawa, 2018.
4. A. Zgirski, R. Gondko *Obliczenia biochemiczne* , PWN, Warszawa, 2010

## Notes

Modified by dr hab. inż. Dżamila Bogusławska, prof. UZ (last modification: 25-05-2021 17:23)

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