



48SJO-BIOCHE12

2025

ECTS: 5.00

**Course syllabus – part A**  
**Biochemistry 1/2****SUBJECT MATTER CONTENT:****Lecture**

Amino acids, peptides and proteins structure, properties and functions. Enzymes – properties, kinetics of reaction and activity regulation. DNA structure, replication and repair. RNA structure, synthesis and processing. Protein synthesis. Regulation of gene expression.

**Seminar**

The major buffer systems in the body (metabolic acidosis and alkalosis). Oxygen toxicity and free-radical injury. Biochemistry of cell membranes. Blood plasma proteins. Hemostasis and thrombosis. Disorders of synthesis and/or structure of proteins. Processing of proteins in the cells.

**Classes**

Quantitative protein identification. Electrophoresis of serum proteins. Fibrinogen release and its quantitative identification. Isolation and identification of peroxidase activity. Determining the Michaelis constant and maximum velocity for peroxidase reaction. Identifying the activity of ALT, AST, and  $\gamma$ -GT in blood serum. Isolation of genomic DNA from blood cells and cheek epithelium cells. Quantitative and qualitative assessment of isolated DNA. Amplification of selected DNA fragment by PCR method.

**TEACHING OBJECTIVE:**

During the course, students are familiarised with the molecular basis of the functioning of the human body under physiological and pathological conditions. They master the most important metabolic pathways and learn how genetic and environmental factors intervene in their course and what consequences their effects have. Students also learn basic laboratory methods and techniques and the equipment used in laboratory diagnostics. They develop the ability to search for reliable information in the field of medical biochemistry.

**DESCRIPTION OF THE LEARNING OUTCOMES OF THE COURSE IN RELATION TO THE DESCRIPTION OF THE CHARACTERISTICS OF THE SECOND LEVEL LEARNING OUTCOMES FOR QUALIFICATIONS AT LEVELS 6-8 OF THE POLISH QUALIFICATION FRAMEWORK IN RELATION TO THE SCIENTIFIC DISCIPLINES AND THE EFFECTS FOR FIELDS OF STUDY:**

**Symbols for outcomes related to the discipline:**

M/NMA\_P7S\_KO+++++, M/NMA\_P7S\_UW++++++, M/NMA\_P7S\_UW+++, M/NMA\_P7S\_WG+++++

**Symbols for outcomes related to the field of study:****Legal acts specifying learning outcomes:**

467/2024 (Medicine),

**Status of the course:** None**Group of courses:** None**Discipline:** Medical Sciences**Classes:**

Lecture (10 h)

Seminar (15 h)

Classes (35 h)

**Step:** Kierunek lekarski pierwszy rok (oferta w jęz. angielskim dla obcokrajowców)**Program:** Medicine**Form of studies:** full-time**Level of studies:** uniform master's studies**Introductory subject:** Biophysics, Chemistry, Cytophysiology, Molecular Biology**Prerequisites:** Level 4 of The European Qualifications Framework (EQF) at least, and the satisfactory level of knowledge and skills covered by the introductory subjects.**Coordinators:**

Edyta Sienkiewicz-Szłapka,  
edyta.sienkiewicz@uwm.edu.pl

K.5+, K.10+, K.9+, K.6+, K.11+, B.U12.++, B.U11+, B.U6+, B.U8.++, D.U7+, KA7\_UW5+, KA7\_UU1+, KA7\_UK2+, B.W10.++, B.W11+, B.W12.+++, B.W13.++, B.W2+, C.W38+, A.W2+, B.W16+, B.W14+

## LEARNING OUTCOMES (Knowledge, Skills, Social competence):

<b><u>W1</u></b>	the structure, properties, and functions of basic ingredients of a cell (proteins and nucleic acids)
<b><u>W2</u></b>	the course and importance of the processes of synthesis, modification and degradation of proteins and nucleic acids, as well as the health implications of these processes perturbations
<b><u>W3</u></b>	functions of the genome, transcriptome and proteome and methods used to study them or used in laboratory diagnostics
<b><u>W4</u></b>	concepts of regulation of genetic information expression (from gene to protein)
<b><u>W5</u></b>	cell catalytic strategies and mechanisms of action of individual enzymes and their cofactors, as well as their biomedical significance
<b><u>W6</u></b>	biochemical aspects of the acid-base balance mechanisms in the body in physiological and pathological conditions
<b><u>W7</u></b>	the major sources of reactive oxygen species, mechanisms of protection against free radicals, and the effects of their action in the cell and in the body
<b><u>W8</u></b>	the structure and composition of the cell membrane, its transport functions and functions related to the transduction of the biological signals with examples of dysfunctions leading to the development of different diseases
<b><u>W9</u></b>	principles of isolation methods and quantitative and qualitative determination of proteins, enzymes, and nucleic acids
<b><u>U1</u></b>	perform isolation, identification and quantitative assessment of proteins and nucleic acids using basic laboratory and molecular techniques (e.g. spectrophotometry, electrophoresis, PCR)
<b><u>U2</u></b>	operate measuring instruments and assess the accuracy of measurements
<b><u>U3</u></b>	analyze the results obtained, perform calculations assessing the concentrations or activity of the determined compounds and draw conclusions based on them, prepare documentation of the performed experiments
<b><u>U4</u></b>	predict the direction of biochemical processes based on knowledge of regulatory mechanisms
<b><u>U5</u></b>	use medical databases and peer-reviewed information sources as well as critically analyze medical literature
<b><u>U6</u></b>	prepare and present scientific information in a simple and understandable way (multimedia presentation)
<b><u>U7</u></b>	cooperates and works in a group assuming various roles in it
<b><u>K1</u></b>	notice one's own limitations and make a self-assessing of educational deficits and needs
<b><u>K2</u></b>	express one's opinion sensibly, candidly, and with respectability to the distinct opinion of the interlocutor
<b><u>K3</u></b>	cooperate in a multicultural and multinational environment and show an understanding of ideological and cultural differences
<b><u>K4</u></b>	present a favorable attitude toward the promotion of a pro-

healthy lifestyle

**K5**

comply with occupational health and safety rules in the laboratory

### TEACHING FORMS AND METHODS:

Lecture-['K1', 'K3', 'K4', 'U4', 'W1', 'W2', 'W3', 'W4', 'W5']-Conversational lecture with the use of multimedia

Seminar-['K1', 'K2', 'K3', 'K4', 'U4', 'U5', 'U6', 'U7', 'W1', 'W2', 'W3', 'W4', 'W5', 'W6', 'W7', 'W8']-Oral presentation on an assigned topic, multimedia presentation, discussion, case study

Classes-['K1', 'K2', 'K3', 'K4', 'K5', 'U1', 'U2', 'U3', 'U5', 'U7', 'W1', 'W2', 'W3', 'W5', 'W9']-laboratory experiments

### FORM AND CONDITIONS OF VERIFYING LEARNING OUTCOMES:

Lecture-(Presentation)-['K2', 'K3', 'K4', 'U4', 'U5', 'U6', 'U7', 'W1', 'W2', 'W4', 'W5', 'W6', 'W7', 'W8']-an oral presentation of the selected problem (with multimedia support)

Lecture-(Written test)-['K1', 'K1', 'K5', 'U1', 'U2', 'U4', 'U4', 'W1', 'W1', 'W2', 'W2', 'W3', 'W3', 'W4', 'W4', 'W5', 'W5', 'W6', 'W7', 'W8', 'W9']-written test of knowledge in the area of the problems assigned to the seminars (short test with 6 questions; questions: closed type with one or more correct answers (BOFs/MCQs), true-false, assignment of the correct answer or open question type with a short answer

Lecture-(Part in the discussion)-['K1', 'K2', 'K3', 'K4', 'U4', 'U5', 'U6', 'U7', 'W1', 'W2', 'W3', 'W4', 'W5', 'W6', 'W7', 'W8']-being active in discussions

Lecture-(Colloquium test)-['K1', 'U4', 'W1', 'W2', 'W3', 'W4', 'W5']-Unit tests checking the knowledge of the problems discussed in the lectures; approx. 40 questions each; questions: closed type with one or more correct answers (BOFs/MCQs), true-false, assignment of the correct answer or open question type with a short answer.

Lecture-(Written test)-['K1', 'K1', 'K5', 'U1', 'U2', 'U4', 'U4', 'W1', 'W1', 'W2', 'W2', 'W3', 'W3', 'W4', 'W4', 'W5', 'W5', 'W6', 'W7', 'W8', 'W9']-written test of knowledge in the area of the problems assigned to the lab classes (short test with 5 questions; questions: closed type with one or more correct answers (BOFs/MCQs), true-false, assignment of the correct answer or open question type with a short answer

Lecture-(Report)-['U1', 'U2', 'U3']-performing analyses and preparing laboratory report

### Literature:

1. **Lippincott Illustrated Reviews: Biochemistry**, A) Emine Ercikan Abali, Susan D. Cline, David S. Franklin, Susan M. Viselli, Wolters Kluwer, 2022, Strony: 625, Tom:1 (literatura podstawowa)
2. **Marks' Basic Medical Biochemistry: A Clinical Approach**, B) Lieberman Michael, Alisa Peet, Wolters Kluwer, 2018, Strony: 1008, Tom:1 (literatura podstawowa)
3. **Lippincott's Illustrated Reviews: Biochemistry**, Harvey Richard and Ferrier Denise, Wolters Kluwer | Lippincott Williams Wilkins, 2017, Strony: 551, Tom:1 (literatura podstawowa)
4. **Harper's Illustrated Biochemistry**, C) Peter J. Kennelly, Kathleen M. Botham, Owen McGuinness, Victor W. Rodwell, P. Anthony Weil, McGraw-Hill, 2023, Strony: 802, Tom:1 (literatura uzupełniająca)
5. **Medical Biochemistry at a glance**, D) Salway J.G., Wiley-Blackwell, 2012, Strony: 169, Tom:1 (literatura uzupełniająca)





**Detailed description of ECTS credits awarded - part B**  
**Biochemistry 1/2**

**48SJO-BIOCHE12**

**2025**

**ECTS: 5.00**

The number of ECTS credits awarded consists of:

1. Contact hours with the academic teacher:

- participation in: Lecture	10 h
- participation in: Seminar	15 h
- participation in: Classes	35 h
- consultation	2 h
Total:	62 h

2. Independent work of a student:

Preparation of reports	10.00 h
Preparation for colloquiums and written tests	35.00 h
preparation for practical classes (lab classes and seminars)	18.00 h
Total:	63.00 h

Total (contact hours + independent work of a student): 125.00 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS,  
ECTS Points = 125.00 h : 25 h/ECTS = **5.00 ECTS**

Average: 5.00 ECTS

- including the number of ECTS credits for contact hours with the direct participation of an academic teacher	2.48 ECTS
- including the number of ECTS credits for hours of independent work of a student	2.52 ECTS