



Course syllabus - part A Molecular Biology

48SJO-MOLBIOL
ECTS: 3.00
CYCLE: 2024

SUBJECT MATTER CONTENT

CLASSES

Principles of work in a molecular biology laboratory. Principles of operation of basic laboratory equipment. Methods of isolating nucleic acids. Quantitative and qualitative analysis of nucleic acids. Enzymes used in molecular biology. Application possibilities and types of polymerase chain reaction. Gene therapy. Human genome project. Genetic databases. Use of quantitative polymerase chain reaction (qPCR) in medical diagnostics. Biological properties of stem cells. Application of stem cells in medicine.

LECTURE

Structure and function of lipids and polysaccharides. Characterization of the primary, secondary, tertiary and quaternary structure of proteins. Protein modifications and their function and regulation of protein degradation. RNA and DNA structure and chromatin structure. DNA replication, repair and recombination and regulation of DNA and RNA degradation. Transcription, translation and regulation of gene expression. Function of the human genome, transcriptome and proteome and methods of their analysis.

TEACHING OBJECTIVE

The student will gain substantive knowledge in the field of: lipid and polysaccharide structure; protein structure and their post-translational and functional modifications; primary and secondary structures of DNA and RNA and chromatin; the function of the human genome, transcriptome and proteome and the processes of DNA replication, repair and recombination, transcription and translation, degradation of DNA, RNA and proteins and the concept of gene expression regulation. Substantive and practical knowledge will be provided in the field of basic (isolation, amplification and electrophoresis of nucleic acids) and more complex methods used in molecular biology (quantitative polymerase chain reaction). The student will acquire knowledge on planning simple scientific research, interpreting results, drawing conclusions and using online databases as a source of information.

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_WG+++

Symbols for outcomes

B.U9.+ , C.W42.+ , K.8.+ , K.5.+ , B.W29.+ ,
B.W13.+ , B.U10.+ , B.U13.+ , B.W12.+ , B.W11.+ ,

**Legal acts specifying
learning outcomes:**
311/2023

Disciplines: medical sciences

Status of the

course: Obligatoryjny

Group of courses: A -

przedmioty podstawowe

Code: ISCED 0912

Field of study: Medicine

Scope of

education: Medicine

Profile of education:

General academic

Form of studies: full-time

Level of studies: uniform

master's studies

Year/semester: /1

Types of classes: Classes,
Lecture

Number of hours in

semester: Classes: 25.00,

Lecture: 5.00

Language of

instruction: English

Introductory subject: no
requirements

Prerequisites: no

requirements

**Name of the organisational
unit conducting the**

course: Katedra

Neurochirurgii

Person responsible for the

realization of the course: dr

hab. n. med. Izabela Małysz-

Cymborska, prof. UWM

e-mail: i.malysz-

cymborska@uwm.edu.pl

Additional remarks:

related to the field of study: B.W14.+, B.U8.+, B.W19.+, K.7.+

LEARNING OUTCOMES:

Knowledge:

W1 - The student knows and understands: the structure of lipids and polysaccharides and their functions in cellular and extracellular structures.

W2 - The student characterizes the primary, secondary, tertiary and quaternary structures of proteins, knows post-translational and functional modifications of proteins and their importance.

W3 - The student knows the function of nucleotides in the cell, the primary and secondary structure of nucleic acids (DNA, RNA) and the structure of chromatin.

W4 - The student knows the functions of the human genome, transcriptome and proteome and the basic methods used to learn and study them; describes the processes of DNA replication, repair and recombination, transcription and translation, and degradation of DNA, RNA and proteins; knows the concepts of gene expression regulation.

W5 - The student has basic knowledge of stem cells and their applications in medicine.

W6 - The student has knowledge of the principles of conducting scientific, observational and experimental research as well as in vitro research serving the development of medicine.

W7 - The student knows the basic directions of therapy development, in particular the possibilities of cell, gene and targeted therapy in specific diseases.

Skills:

U1 - The student is able to use basic laboratory techniques such as isolation of nucleic acids, setting up PCR reactions, and electrophoresis of nucleic acids in agarose gel.

U2 - The student is able to operate simple measuring devices and assess the accuracy of measurements performed.

U3 - The student uses databases, including online ones, and searches for the necessary information using available tools.

U4 - The student is able to plan and carry out simple scientific research, interpret its results and draw conclusions.

Social competence:

K1 - The student is ready to notice, recognize and self-assess educational deficits and needs.

K2 - The student is ready to use objective sources of information.

K3 - The student is ready to formulate conclusions based on his/her own measurements and observations.

TEACHING FORMS AND METHODS:

Classes(W1;W2;W3;W4;K1;K2;K3;):Classes - Multimedia presentations constituting a theoretical introduction to the topic being implemented (W4;W5;W6;W7;W8;U1;U2;U3;U4;K1;K2;K3). Laboratory classes-

Carrying out basic laboratory analyses related to the topic of the classes, under observation and after prior training by the exercise instructor (U1;U2;U3;U4;K1;K2;K3).

Lecture(W4;W5;W6;W7;U1;U2;U3;U4;K1;K2;K3;):Lecture

(W1;W2;W3;W4; K1;K2;K3;): informative with multimedia presentation.

FORM AND CONDITIONS OF VERIFYING LEARNING

OUTCOMES:

Classes (Written test) - Written tests with closed questions to check preparation for current exercises. -

Classes (Colloquium test) - Written test with closed questions. The condition for passing is to obtain at least 70% of all possible points. -

Lecture (Written exam) - Written test with single-choice closed questions. The condition for passing is to obtain at least 60% of all

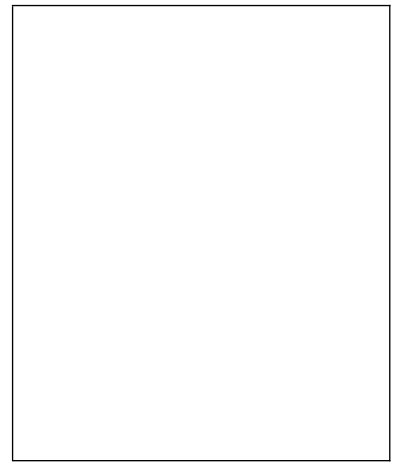
possible points. -

BASIC LITERATURE:

1. Allison L.A., *Fundamental molecular biology*, Wyd. Blackwell Publishing, R. 2007
2. Nancy L Craig, Rachel Green, Carol Greider, Gisela Storz, Cynthia W, *Molecular Biology: Principles of Genome Function*, Wyd. Oxford University Press, R. 2021

SUPPLEMENTARY LITERATURE:

1. Kenneth Kaushansky, Josef T. Prchal, Linda J. Burns, Marshall A. Lichtman, Marcel Levi, David C. Lin, *Williams Hematology, Chapter 9*, Wyd. McGraw Hill / Medical, R. 2010



Detailed description of ECTS credits awarded - part B

**48SJO-
MOLBIOL
ECTS: 3.00
CYCLE: 2024**

Molecular Biology

The number of ECTS credits awarded consists of:

1. Contact hours with the academic teacher:

| | |
|-----------------------------|----------------|
| - participation in: Classes | 25.0 h |
| - participation in: Lecture | 5.0 h |
| - consultation | 4.0 |
| | Total: 34.0 h. |

2. Independent work of a student:

| | |
|------------------------------------------------|---------|
| Preparation for tests, colloquiums, and exams. | 41.00 h |
|------------------------------------------------|---------|

Total: 41.0 h

contact hours + independent work of a student Total: 75.0 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS credit = 75.0 h : 25.0 h/ECTS = 3.00 ECTS on average: 3.0 ECTS

- including the number of ECTS credits for contact hours with the direct participation of an academic teacher: 0,00 ECTS points,

- including the number of ECTS credits for hours of independent work of a student: