UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN

48SJO-MOLBIOL
2024
ECTS: 3.00

Course sylabus – part A
Molecular Biology

SUBJECT MATTER CONTENT:

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 proteomeand methods of their analysis.

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.

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 andelectrophoresis 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_KO+++, M/NMA_P7S_ UW+++, M/NMA_P7S_WG+++++++

Legal acts specifying learning outcomes: 467/2024 (Medicine),
Status of the course:
Group of courses:
Discipline: Medical Sciences

Program: Medicine
Form of studies:full-time
Level of studies: uniform master's studies

Introductory subject: no requirements

Prerequisites: Basic knowledge from biology.

Coordinators:

Izabela Małysz-Cymborska, i.malysz-cymborska@uwm.edu.pl

Symbols for outcomes related to the field of study:

K.5+, K.7.+, K.8.+, B.U12.+, B.U8.+, B.U11.+, B.W9.+, B.W10.+, B.W11.+, B.W12.+, B.W14.+, B.W18.+, B.W26.+

LEARNING OUTCOMES (Knowledge, Skills, 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.

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

U3 The student is able to plan and carry out simple scientific research, interpret its results and draw conclusions.

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 knows the basic methods used in laboratory diagnosis, including protein and nucleic acid electrophoresis.

W6 Student knows the functions and applications of stem cells in medicine.

W7 Student knows principles of conducting scientific research for the development of medicine.

TEACHING FORMS AND METHODS:

Lecture-[]-Lecture (W1;W2;W3;W4;K1;K2;K3;): informative with multimedia presentation.-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 proteomeand methods of their analysis.

Classes-[]-Multimedia presentations constituting a theoretical introduction to the topic being implemented (W4;W5;W6;W7;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;K1;K2;K3).-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.

FORM AND CONDITIONS OF VERIFYING LEARNING OUTCOMES:

Classes-(Written test)-[]-Written tests with closed questions to check preparation for current exercises (W4;W5;W6;W7;U1;U2;U3;K1;K2;K3).

Lecture-(Written exam)-[]-Written test with single-choice closed questions. The condition for passing is to obtain at least 60% of all possible points (W1;W2;W3;W4;W5;W6;K1;K2;K3).

Classes-(Colloquium test)-[]-Written test with closed questions. The condition for passing is to obtain at least 70% of all possible points (W4;W5;W6;W7;U1;U2;U3;K1;K2;K3).

Literature:

1. ***Williams Hematology, Chapter 9***, Kenneth Kaushansky, Josef T. Prchal, Linda J. Burns, Marshall A. Lichtman, Marcel Levi, David C. Lin, McGraw Hill / Medical, 2010, Strony: , Tom: (literatura uzupełniająca)

2. ***Fundamental molecular biology***, Allison L.A., Blackwell Publishing, 2007, Strony: , Tom: (literatura podstawowa)

3. ***Molecular Biology: Principles of Genome Function***, Nancy L Craig, Rachel Green, Carol Greider, Gisela Storz, Cynthia W, Oxford University Press, 2021, Strony: , Tom: (literatura podstawowa)

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Detailed description of ECTS credits awarded - part B

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2024
ECTS: 3.00

Molecular Biology

The number of ECTS credits awarded consists of:

1. Contact hours with the academic teacher:

- participation in:	25 h
- participation in:	5 h
- consultation	4 h
	Total: 34 h

2. Independent work of a student:

Preparation for tests, colloquiums, and exams.	41.00 h
	Total: 41.00 h

Total (contact hours + independent work of a student): 75.00 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS,
ECTS Points = 75.00 h : 25 h/ECTS = **3.00** ECTS

Average: 3.00 ECTS

- including the number of ECTS credits for contact hours with the direct participation of an academic teacher	1.36 ECTS
- including the number of ECTS credits for hours of independent work of a student	1.64 ECTS