



48SJO-MBAG
ECTS: 4.00
CYCLE: 2023

Course syllabus - part A Molecular Biology and Genetics

SUBJECT MATTER CONTENT

TEACHING OBJECTIVE

Transfer of knowledge of the basis of genetics - the basic concepts and mechanisms of genetic inheritance. Acquire the skills of determining the selected chromosomal aberrations and genetic diseases. Calculating frequency of alleles and genotypes in the population and to determine the reasons that affect their changes. Influence of environmental factors on the body and the environment. Transfer of knowledge of the basic methods used in molecular biology. The basic concepts of simple research, interpretation of results and how to draw conclusions. The acquisition of the ability to use online databases as a source of information. Knowledge of the problems of stem cells and their use in medicine.

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 related to the field of study:

B.W27.+, B.U13.+, B.W12.+, C.W8.+, C.U3.+, K.8.+, B.W29.+, C.U2.+, C.W10.+, C.U5.+, K.7.+, D.W22.+, B.W18.+, C.W1.+, C.W2.+, B.U8.+, C.U1.+, B.W14.+, K.5.+, C.W5.+, K.9.+, B.W11.+, C.W6.+, C.U4.+, B.U10.+, C.W4.+, B.U3.+, B.W19.+, C.W7.+, B.W13.+

LEARNING OUTCOMES:

Knowledge:

W1 - The student knows and understands: (B.W11) the structure of lipids and polysaccharides, and their functions in cell and extracellular structures;

W2 - (B.W12) the primary, secondary, tertiary, and quaternary structures of proteins, post-translation and functional modifications of proteins and their significance;

W3 - (B.W13) the functions of nucleotides in the cell, the primary and secondary DNA and RNA structures, and the structure of chromatin

W4 - (B.W14) the functions of the human genome, transcriptome, and proteome, and the basic methods employed in testing them, the processes of the DNA replication, repair, and recombination, the processes of DNA, RNA, and protein transcription, translation, and degradation, and the concepts of gene expression regulation

W5 - (B.W18) the following processes: the cell cycle, proliferation, cell differentiation and ageing, apoptosis and necrosis, and their impact on

Legal acts specifying learning outcomes:
3112022

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: Lecture, Classes

Number of hours in semester:Lecture: 10.00, Classes: 40.00

Language of

instruction:English

Introductory subject: none

Prerequisites: none

Name of the organisational unit conducting the

course:Katedra Biologii Medycznej

Person responsible for the realization of the

course:prof. dr hab. Ewa Dzika

e-mail: e.dzika@uwm.edu.pl

Additional remarks:

the functioning of the organism

W6 - (C.W1, C.W2) the basic notions of genetics; the phenomena of gene coupling and interaction;

W7 - (C.W5) the rules determining inheritance of various numbers of traits, inheritance of quantitative traits, independent inheritance of traits, and extranuclear inheritance of genetic information (C.W6) genetic determinants of the human blood group and the serological conflict of Rh incompatibility

W8 - (C.W4) the chromosome composition and the molecular background of mutagenesis, (C.W7) autosome and heterosome aberrations as the source of diseases, including oncogenesis and tumours; (C.W9) the basics of diagnosing gene and chromosome mutations responsible for hereditary and acquired diseases, including neoplasms

W9 - (C.W10) the benefits and threats stemming from the presence of genetically modified organisms (GMOs) in the ecosystem

W10 - (B.W19) the basics of the stem cell issues and stem cell application in medicine

W11 - (C.W8) the factors determining the primary and secondary genetic balance in the population

W12 - (B.W27) the basic methods of statistical analysis employed in population and diagnostic surveys

W13 - (B.W.29) the principles of conducting scientific research, observational and experimental studies, and in vitro tests contributing to the advancement of medicine

W14 - (D.W22) the emerging of new specialties in the scientific discipline of medical sciences, and the achievements of the top representatives of the Polish and world medicine

Skills:

U1 - (C.U1) Student analyses the genetic interbreeds and pedigrees of human traits and diseases, and assess the risk that a child will be borne with chromosomal aberrations

U2 - (C.U2) identify the indications for prenatal tests; (C.U3) make decisions about the need to have cytogenetic and molecular tests performed (C.U4) take morphometric measurements, analyse the morphogram, and record the disease karyotypes;

U4 - (B.U8.) apply basic laboratory techniques such as qualitative analysis, titration, colorimetry, pH-metry, chromatography, electrophoresis of proteins and nucleic acids

U5 - (B.U10) use databases, including those available on the Internet, and find the necessary information with the available tools

U6 - (B.U13) plan and perform simple scientific studies, interpret its results, and draw conclusions

U7 - (B.U3) calculate the molar and percent concentrations of compounds, and the concentrations of substances in isoosmotic, single and multiple-component solutions

U8 - (C.U.5) asses the risk that a specific disease will manifest itself in the offspring, based on family predispositions and the impact of environmental factors

Social competence:

K1 - In terms of social competences, the graduate is ready to: (K.5) notice and recognize one's own limitations and make a self-assessment of educational deficits and needs

K2 - (K.7) use objective sources of information;

K3 - (K.8) formulate conclusions from own measurements and observations;

K4 - (K.9) implement the principles of professional camaraderie and cooperation in a team of specialists, including representatives of other medical professions, also in a multicultural and multinational environment.

TEACHING FORMS AND METHODS:

Lecture(W1;W2;W3;W4;W14;K1;K2;K4;):information provided with multimedia presentations

Classes(W3;W5;W6;W7;W8;W9;W10;W11;W12;W13;W14;U1;U2;U4;U5;U6;U7;U8;K1;K2;K3;K4;):Lectures - solving genetic problems and tasks, discussion Laboratory exercises - solving tasks and genetic problems on the basis of prepared worksheets and instructions

FORM AND CONDITIONS OF VERIFYING LEARNING

OUTCOMES:

Lecture (Written exam) - Participation in discussions 1 - assessment of involvement in discussion and ability to solve genetic and molecular biology tasks (W1, W10, W11, W12, W13, W14, W2, W3, W4, W5, W6, U1, U2, U3, K1) -

Classes (Written test) - written tests with open questions checking preparation for current exercises -

Classes (Colloquium test) - Written colloquiums - written test with closed questions (W1, W10, W11, W14, W2, W3, W4, W6, U1, U2, U3, U4, U5, U6, U7, K1) Completion of practical exercises- (U4, U5, U6, U7) Practical colloquium - Completion of practical exercises: (U4, U5, U6, U7) Report 1 - Assessment of tasks and problem solving with work cards (W1, W2, W3, W4, W5, U1, U2) -

Classes (Write-up) - Written quizzes - Short tests with open ended questions (W6, W7, W8, W9) -

Classes (Part in the discussion) - Participation in discussions 1 - assessment of involvement in discussion and ability to solve genetic and molecular biology tasks (W1, W10, W11, W12, W13, W14, W2, W3, W4, W5, W6, U1, U2, U3, K1) -

Classes (Colloquium practical) - Practical exercises -

BASIC LITERATURE:

1. A. Buczek, *Medical Biology, Part 2*, Wyd. Koliber, Lublin, R. 2007
2. A. Buczek, *Medical Biology, Part 1*, Wyd. Koliber, Lublin, R. 2007

SUPPLEMENTARY LITERATURE:

1. Jorde, Lynn B., et.al., *Medical Genetics 6th edition*, Wyd. Elsevier MOSBY, R. 2019

Detailed description of ECTS credits awarded - part B

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Molecular Biology and Genetics

The number of ECTS credits awarded consists of:

1. Contact hours with the academic teacher:

- participation in: Lecture	10.0 h
- participation in: Classes	40.0 h
- consultation	4.0
	Total: 54.0 h.

2. Independent work of a student:

preparation for exercises (written tests, participation in discussions)	10.00 h
exam preparation	16.00 h
preparation for the theoretical and practical colloquium	20.00 h

Total: 46.0 h

contact hours + independent work of a student Total: 100.0 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS credit = 100.0 h : 25.0 h/ECTS = 4.00 ECTS on average: 4.0 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: