

| | | | | | |
|---|---|-----------------------|---|--------------------------------------|-----------------------|
| <i>Name of the course</i> | Medical Biology | | | Code | |
| <i>Type of study program Cycle</i> | Integrated study program, Medicine | | | Year of study | I |
| <i>Credits (ECTS) :</i> | 10 | <i>Semester</i> | I | Number of hours per semester (l+e+s) | 110 (42+30+38) |
| <i>Status of the course:</i> | mandatory | <i>Preconditions:</i> | | <i>Comparative conditions:</i> | |
| <i>Access to course:</i> | First year medical students | | | <i>Hours of instructions:</i> | According to schedule |
| <i>Course teacher:</i> | Professor Katarina Vukojević, MD, PhD, MSc | | | | |
| <i>Consultations:</i> | By e-mail | | | | |
| <i>E-mail address and phone number:</i> | katarina.vukojevic@mef.sum.ba | | | | |
| <i>Associate teachers</i> | Prof. Sandra Kostić, Prof. Violeta Soljić, Prof. Suzana Konjevoda, Prof. Snježana Mardešić, Senior assistant Una Glamočlija, Senior assistant Maja Barbarić, Senior assistant Tanja Šimić Bilandžija, Assistant Martina Vukoja, Assistant Anita Muić | | | | |
| <i>Consultations:</i> | By e-mail | | | | |
| <i>E-mail address and phone number:</i> | katarina.vukojevic@mef.sum.ba | | | | |
| <i>The aims of the course:</i> | Principal aim of this course is making an introduction for students to the basic principles of modern biological science which is of high importance for the diagnosis and therapy of human diseases, and the future of medicine. During this course, students should acquire terminology necessary for understanding of modern biomedical literature. The students will learn basic cell biology, molecular biology, developmental biology and genetics with an emphasis on human biology. They will be actively involved in problem-orientated work, organized in the form of lectures, seminars and exercises in order to develop practical communication skills and understanding of fundamental biological processes, as well as critical thinking based on acquired knowledge in modern biological science. | | | | |

| | |
|--|---|
| <p><i>Learning outcomes (general and specific competences):</i></p> | <p><u>General competences:</u></p> <ol style="list-style-type: none"> 1. Capacity for independent learning 2. Development of communication skills 3. Capacity for critical questioning and scientific reasoning 4. Development of creative thinking 5. Ability to use information technology and adoption of new information 6. Ability of teamwork - group work 7. Development of ethics and responsibility <p><u>Specific competences:</u></p> <ol style="list-style-type: none"> 1. Remembering the basic structure and function of cells (macromolecules, cytoskeleton, transport of macromolecules, organelles, mitochondria and energy production, cell cycle, cell signaling and tumor biology). 2. Remembering the basics of molecular cell biology (cell genome, replication and repair of DNA, transcription and RNA species, regulation of transcription, RNA modification, translation, regulation of translation, synthesis and modification of proteins, transport and function of proteins) 3. Remembering the basics of developmental biology (fertilization, meiosis, mitosis, stem cells and the molecular mechanisms of cell differentiation) 4. Understanding the medical human genetics (basic principles of genetic inheritance, sexual and autosomal inheritance, chromosome aberrations, genetic counseling) |
|--|---|

| | | | | |
|--|---|------------------------------------|------------------------------|--------------------------------|
| Course content (Syllabus): | During the course, knowledge of the students will be tested through seminars and exercises. | | | |
| Format of instruction (mark in bold) | Lectures | Exercises | Seminars | Independent assignments |
| | Consultations | Work with mentor | Field work | Other |
| | Remarks: | | | |
| Student responsibilities | Students are required to attend and actively participate all classes. | | | |
| Screening student work (mark in bold) | Class attendance | Class participations | Seminars | Practical training |
| | Oral exam | Written exam | Continuous assessment | Essay |
| | | | | |
| Detailed evaluation within a <i>European system of points</i> | | | | |
| STUDENTS RESPONSIBILITIES | HOURS | PROPORTIONS OF ECTS CREDITS | PROPORTION S OF MARK | |
| Class attendance and participations | 110 | 4 | 0% | |
| Seminars | 30 | 3 | 20% | |
| Written exam | 80 | 3 | 80% | |
| Oral exam | 0 | | 0% | |

Further explanation: The course of Medical biology is performed during the first semester in the form of lectures (42 hours), seminars (38 hours) and exercises (30 hours). All forms of education are obligatory, and the participation of students will be monitored regularly.

The teacher evaluates the student's participation in the seminar (demonstrated knowledge, understanding, ability to define problems and reasoning).

Seminars consists of seminar work and quizzes. For seminar work each student will get their own topic and presentation will be graded from 1-5. This mark will be evaluated as 10% of grade. All 16 seminars will finish with quiz (10 question per seminar). Maximal number of points can be 160 (16 seminars). This points will be evaluated as 10% of final grade according to the key: 91 – 110 – pass; 111 – 120 – good; 121 – 140 – very good; 141 - 160 – excellent.

Written test consists of 80 questions; 55 percent is necessary to pass (44 points). Written test will be evaluated as 80% of final grade.

44-52 –pass

53-62 – good

63-71 – very good

72-80 – excellent

Final mark: seminar work (10% of grade) + seminar quizzes (10% of grade) + written exam (80 % of grade).

| | |
|--|--|
| Required literature: | OBLIGATORY LITERATURE: Cooper GM, Hausman RE. The Cell, a Molecular Approach. 7th ed. Washington DC, Sunderland (Massachussets): ASM Press, Sinauer Associate Cox TM, Sinclair J. Molecular biology in medicine. Blackwell Science, 1997. Oxford, UK (5th and 17th chapter) ADDITIONAL LITERATURE: Alberts B et. all. Essential Cell Biology, New York, Garland Science,3/e, 2009. Turnpenny P, Ellard S. Emery's Elements of Medical Genetics. 14th edition, Elsevier Churchill Livingstone, Edinburgh 2011. |
| Optional literature: | <ol style="list-style-type: none"> 1. TM Cox: Molecular biology in medicine, Medical Biochemists, Zagreb, 2000. 2. Specially prepared manuscripts for seminars and exercises |
| Additional information about the course | www.mef.sum.ba |

Annexes: calendar classes

| <i>The number of teaching units</i> | TOPICS AND LITERATURE |
|-------------------------------------|--|
| I. | Title: Cell - evolution prokaryotes vs. eukaryotes. |
| | Short description: structure and function of cells. Prokaryotes vs. Eukaryote. The cell chemistry. Macromolecules, cell compartments, inner membrane |
| | Literature: mandatory and additional |
| II. | Title: cell structure, the cell chemistry, macromolecules, enzymes |
| | Short description: Deoxyribonucleic acid, structure, replication and DNA Repair, ribonucleic Transcription and regulation of transcription |
| | Literature: mandatory and additional |
| III. | Title: cell membrane |
| | Short description: The structure of cell membranes. Transport of substances through the membrane and endocytosis. |
| | Literature: mandatory and additional |
| IV. | Title: Nucleic Acids, gens, eukaryotic organisms, DNA |
| | Short description: The core of the structure and function of the nucleus and nucleoli. Transportation to / from the nucleus. The organization and reshuffling of the genome. |
| | Literature: mandatory and additional |
| V. | Title: Nucleus, transport, organization, nucleolus |
| | Short description: From DNA to protein. Genetic code. Translation. Protein sorting and transport. ER, Golgi apparatus and lysosomes. Vesicular transport. |
| | Literature: mandatory and additional |
| VI. | Title: Cytoskeleton - microfilaments, intermediar filaments, microtubules |
| | Short description: Description and explanation of the structure, organization, assembly and disassembly of filaments |
| | Literature: mandatory and additional |
| VII. | Title: Extracellular matrix and organization, cell surface, cellular interactions |
| | Short description: solubilization, isolation, separation and visualization of DNA. Gel electrophoresis. Restriction enzymes. The plasmids and recombinant |
| | Literature: mandatory and additional |
| VIII. | Title: Cell research methods and microscopy |
| | Short description: The cytoskeleton and cell movement, extracellular matrix and intercellular connections. |
| | Literature: mandatory and additional |
| IX. | Title: Introduction to molecular biology - DNA replication and telomeres |
| | Short description: Signal transduction in the cell. Stem cells and apoptosis. |
| | Literature: mandatory and additional |
| X. | Title: Maintenance and DNA recombination, DNA repair |
| | Short description: Cell cycle, basics of molecular biology and genetics of tumors. |
| | Literature: mandatory and additional |

| | |
|---------------|--|
| XI. | Title: Synthesis and RNA transcription, transcription factors |
| | Short description: all types of RNA in the cell and description of their function |
| | Literature: mandatory and additional |
| XII. | Title: synthesis and RNA transcription, RNA trafficking |
| | Short description: synthesis and RNA transcription, RNA trafficking |
| | Literature: mandatory and additional |
| XIII. | Title: genomic DNA, recombination |
| | Short description: defining the role of DNA as the genetic material |
| | Literature: mandatory and additional |
| XIV. | Title: synthesis of proteins, translation, protein sorting and transport |
| | Short description: the main terms related to translation: aminoacyl tRNA synthesis, genetic code, wobble base pair, Shine-Delgarno sequence. |
| | Literature: mandatory and additional |
| XV. | Title: Bioenergetics and metabolism, mitochondria and peroxisomes |
| | Short description: The function and structure of mitochondria and peroxisomes. |
| | Literature: mandatory and additional |
| XVI. | Title: transport and protein sorting - ER, Golgi Apparatus |
| | Short description: solubilization, isolation, separation and visualization of proteins. Electrophoresis (SDS-PAGE), Commasie blu and Ponso S With meted. Western blot. Microarray. ELISA, flow cytometry. Production of monoclonal antibodies. |
| | Literature: mandatory and additional |
| | Literature: mandatory and additional |
| XVII. | Title: protein transport - vesicular transport, lysosome |
| | Description: vesicular transport, lysosome |
| | Literature: mandatory and additional |
| XVIII. | Title: Cell signaling - signal molecules and action of cell surface receptors |
| | Description: signal molecules and action of cell surface receptors |
| | Literature: |
| XIX. | Title: Cell signaling - intracellular signal transduction, cytoskeleton and |
| | Description: intracellular signal transduction, cytoskeleton and signaling |
| | Literature: mandatory and additional |
| XX. | Title: cell cycle - cell cycle checkpoints, cell cycle regulation, mitosis and |
| | Description: cell cycle checkpoints, cell cycle regulation, mitosis and meiosis |
| | Literature: mandatory and additional |
| XXI. | Title: Meiosis |
| | Description: fertilization and early embryonic development |
| | Literature: mandatory and additional |
| XXII. | Title: Programed cell death |
| | Description: inner and outer apoptotic pathways |
| | Literature: mandatory and additional |
| XXIII. | Title: Stem cells |
| | Description: stem cell, embryonic stem cell, therapeutic cloning, |

| | |
|--------------|--|
| | Literature: mandatory and additional |
| XXIV. | Title: Cancer - development and causes, tumor viruses, oncogenes |
| | Description: development and causes, tumor viruses, oncogenes |
| | Literature: mandatory and additional |