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|  | | | **UNIVERSITY OF EAST SARAJEVO**  Faculty of Medicine | | | | | | | | | | |  | | |
| ***Study program:medicine*** | | | | | | | | | | |
| Integrated academic studies | | | | | | I study year | | | | |
| **Full subject title** | | | CELL BIOLOGY AND HUMAN GENETICS | | | | | | | | | | | | | |
| **Department** | | | Department for preclinical subjects, Faculty of Medicine in Foča | | | | | | | | | | | | | |
| **Subject code** | | | | | | **Subject status** | | | | | **Semester** | | | **ECTS** | | |
|
| МЕ-01-1-003-2 | | | | | | compulsory | | | | | II | | | 9 | | |
| **Professor/ -s** | | | Full professor. Milan Kulic, PhD, assistant professor. Nikolina Elez-Burnjakovic, PhD | | | | | | | | | | | | | |
| **Associate/ -s** | | | asisistant., Sara Rakocevic, MA, Assistant Anđela Mandić | | | | | | | | | | | | | |
| **Number of lectures/ teaching workload (per week)** | | | | | | | **Individual student workload (in hours per semester)** | | | | | | | **Coefficient of student workload So[[1]](#footnote-1)** | | |
| **L** | **E** | | | | **SP** | | **L** | | | **E** | | **SP** | | **So** | | |
| 3 | 4 | | | | 0 | | 3\*15\*1 | | | 4\*15\*1 | | 0\*15\*1 | | 1 | | |
| total teaching workload (in hours, per semester)  3\*15 + 4\*15 + 0\*15 = 105 | | | | | | | | total student workload (in hours, per semester)  3\*15\*1 +4\*15\*1 + 0\*15\*1 = 105 | | | | | | | | |
| Total subject workload (teaching + student):105 + 105 = 210 hours per semester | | | | | | | | | | | | | | | | |
| **Learning outcomes** | | 1. Identifying the organization and function of the cell at the molecular level, which will facilitate the understanding of pathological processes as the cause of the disease that students meet on other subjects during the studies.  2. Acquiring basic knowledge in human genetics and the application of acquired knowledge in other medical disciplines during the course of the study. | | | | | | | | | | | | | | |
| **Preconditions** | | No preconditions | | | | | | | | | | | | | | |
| **Teaching methods** | | Lectures, exercises, seminar papers and consultations | | | | | | | | | | | | | | |
| **Subject content per week** | | **Lectures:**  1.Evolution of a cell. Chemical composition of the cell (biologically important chemical elements, water and organic molecules).  2. Organization of eukaryotic cells. Transport through cell membranes.  3. Organization of eukaryotic cells. Cell study methods. Model organisms.  4. Enzymes and living systems. Cellular breathing. Mitochondria – ATP synthesis  5. Hereditary material. Nucleic acids. DNA and RNA. The flow of information in a cell.  6. Replication of DNA molecules. Transcription. Processing the primary transcript. Genetic code.  7. Translation. Regulation of gene activity. Regulation of gene activities on the DNA level. Regulation of gene activities at the level of transcription and translation. Chromosomes, chemical composition and structure. Methods of analysis and coloring of chromosomes. Human genome.  8. Cell cycle (control factors) and cell population. Gametogenesis.  9. Genetic determination of sex. Development and reproduction of gonads. Differentiation of sex drain. Disorders of gender development. Genetic mutations. Mechanisms of mutation formation. Mutagenic agents.  10. Recombination. Crossovers. DNA reparation mechanisms. Diseases caused by disorders of reparation mechanisms.  11. Changes in the number of chromosomes. Aneuploidy and polyploidy. Frequency of chromosomal aberrations. Indications for karyotype analysis.  12. Changes in the structure of chromosomes. Deletion. Duplication. Ring chromosome. Isochromosomes. Inversions and translocations.  13. Inheritance in humans. Monogenic inheritance. Codominant inheritance. Multifactorial Inheritance. Mitochondrial inheritance. Genealogy. Genetic counseling and prevention of hereditary diseases.  14. Genetics of cancer. Characteristics of the malignant cell. Genetic changes during carcinogenesis. Factors of the environment and carcinogenesis. Cancer as a multifactorial disease. Genetics of aging. Biological theories of aging. Systemic aging theories. Cell aging theories. Genetic basis of aging.  15. Population genetics. Frequency of gene alleles. Panmixion, inbreeding and outbreeding. Genetic engineering. DNA cloning. Nucleic acid hybridization. DNA sequencing. Gene therapy. Molecular markers in human genetics.  **Exercises:**  1. Introduction to microscopy (microscopy). Prokaryotic and eukaryotic cells (drawing, animations)  2. Cell membrane and membrane organelles (drawing, animations). Non-membrane organelles (drawing, animation)  3. Molecular genetics (drawing, tasks). Karyotype  4. Barr body (making of the preparation). Seminar papers  5.Mitosis (animation, observation of the preparation). Meiosis (animation, drawing)  6.Gametogenesis (observation of the preparation, drawing).  7. Numerical aberrations of full chromosomes (tasks). Numerical aberrations of autosomes (tasks)  8.Structural aberrations (tasks).  9. Mendel's laws of inheritance (tasks).  10. Gene interaction (tasks).  11. Sex-linked inheritance (tasks)  12. Genealogy (tasks).  13. Seminar papers.  14. Population genetics (tasks)  15. Molecular Genetics Methods: DNA Laboratory (laboratory work). Isolation of DNA (laboratory work) | | | | | | | | | | | | | | |
| **Compulsory literature** | | | | | | | | | | | | | | | | |
| **Author/s** | | | | **Publication title, Publisher** | | | | | | | | | **Year** | | **Pages (from-to)** | |
| Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard | | | | *Genetics in Medicine, Thompson and Thomspon, ISBN: 9781416030805, 7th edition* | | | | | | | | | 2007 | |  | |
| Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter | | | | *Molecular biology of the cell,* Garland Science, Taylor & Francis Group, ISBN 978-0-8153-4432-2, 6th edition | | | | | | | | | 2015 | |  | |
| Geoffrey M Cooper | | | | *The cell*, Sunderland (MA): Sinauer Associates, ISBN-10: 0-87893-106-6 | | | | | | | | | 2000 | |  | |
| **Additional literature** | | | | | | | | | | | | | | | | |
| **Author/s** | | | | **Publication title, Publisher** | | | | | | | | | **Year** | | **Pages (from-to)** | |
| Csaba Szalai | | | | Medical genetics and genomics, Semmelweis University, ISBN 978 963 279 187 6 | | | | | | | | | 2016 | |  | |
| **Student responsibilities, types of student assessment and grading** | | | | | **Grading policy** | | | | | | | | **Points** | | | **Percentage** |
| Pre-exam activities | | | | | | | | | | | |
| lecture/exercise attendance | | | | | | | | 10 | | 10% | |
| seminar paper | | | | | | | | 10 | | 10% | |
| colloquium | | | | | | | | 30 | | 30% | |
| Final exam | | | | | | | | | | | |
| practical exam | | | | | | | | 10 | | 10% | |
| final test | | | | | | | | 40 | | 40% | |
| TOTAL | | | | | | | | 100 | | 100 % | |
| **Certification date** | | | | | December 13 th 2018 | | | | | | | | | | | |

1. Coefficient of student workload So is calculated as it follows:

   а) for the study programs not going through the licensing process: So = (total workload in semester for all the subjects 900 hrs – total teaching workload L+E in semester for all the subjects 870 hrs)/ total teaching workload L+E in semester for all the subjects \_\_\_\_\_ hrs = \_\_\_\_. Consult form content and its explanation.

   b) for the study programs going through the licencing process, it is necessary to use form content and its explanation. [↑](#footnote-ref-1)