


Faculty of Medicine University of Niš	Study program: INTEGRATED ACADEMIC STUDIES OF MEDICINE ACCREDITATION 2018	
Course title: Molecular and human genetics		
Course head: Prof. dr Stevo Najman		
Course status:	required	
Semester : I	Year of study: I	
ECTS: 7	Course code: M – I 1	
Course purpose:		
Acquisition of knowledge of theoretical principles and practical skills in Molecular and Human Genetics		
Course outcome: (knowledge, skills, attitudes)		
<p>After the completed course, a student should be able to demonstrate:</p> <ul style="list-style-type: none"> ▪ good command of microscopy techniques ▪ good command of PC skills, as a learning resource ▪ to describe and explain the transfer of information from DNA molecules, via RNA, to proteins ▪ to understand the relationships of cytoplasmic and nuclear processes ▪ to understand the fundamental laws of heredity and to apply the knowledge in human situation. ▪ to understand and explain the mechanisms of genetic diversity and to be able to associate genetic with phenotypic changes. ▪ to apply the acquired knowledge in Molecular and Human Genetics in other biomedical courses. 		
Nr. of classes of active teaching: 75		
Lectures: 45	Practice: 24	OFT: 6
Course content		
<p><u>Theory</u></p> <p>Cell: Prokaryotic and eucaryotic organization. Genetic characteristics of viruses. Basic characteristics of hereditary material. Structure & function of DNA. Human genome. Genetic basis of reproduction: chromatin and chromosome. Cell cycle and mitosis. Meiosis. Gametogenesis. Cytogenetics: human karyotype. Chromosomal aberrations. Numerical chromosomal aberrations (polyploidy, aneuploidy, mechanisms of occurrence of chromosomal numerical aberrations). Structural chromosomal aberrations (causes, mechanisms of occurrence, classification. Deletions. Duplications. Isochromosomes. Inversions. translocations). Classical genetics: Mendelian laws of heredity. Autosomal dominant and recessive inheritance. Correlated inheritance. Inheritance of sex and sex-linked traits. Intra- and interlocus gene interactions. Polygenic inheritance. Molecular biology: transfers of hereditary informations in the cell. Genetic code. Transcription. Posttranscriptional RNA processing. Types & role of RNA. Translation. Regulation of gene expression in prokaryotes. Mechanisms of regulation of gene expression in eucaryotes. Mutations. Mutagenic factors. Genetic recombinations. Crossing-over – mechanisms and significance. DNA molecule repair. Hereditary disorders caused by DNA repair errors. Human genetics: monogenic and polygenic human traits. Monogenic diseases. Multifactorial hereditary diseases. Gene families. Globin gene family. Immunogenetics. Oncogenetics (cell cycle control, protooncogenes, tumor-suppressor genes, genetic basis of malignant transformation, cancerogenesis). Chromosomopathies of autosomes and sex chromosomes. Genetics of development (molecular-genetic mechanisms in embryogenesis, human sex determination), genetic basis of sex differentiation and related disorders). Genetics of human populations (gene polymorphisms, population-genetic research in medicine). Methods in human genetics. Techniques and methods of DNA analysis. Use of DNA technologies and modern biotechnologies in medicine.</p> <p><u>Practice</u></p> <p>Use of ITs in biomedicine. Microscope and microscopy. Nucleus. Chromatin. Chromosome. Karyotype. Mitosis. Gametogenesis. Chromosomal aberrations. Seminar in cytogenetics. Basic principles of heredity (tasks): mono-, di-, and test of crossbreeding, multiple alleles, polygenic inheritance, correlated inheritance, preparation of chromosomal maps, sex-linked inheritance, genealogic trees. Isolation of DNA (demonstration). Transfer of hereditary information in the cell (tasks). Regulation of gene expression, Mutations, Genetic recombinations (tasks). Seminar in molecular biology. Genetics of human populations (tasks). Technology of rDNA (tasks). Seminar in human genetics.</p>		

Seminars

Seminar in cytogenetics. Seminar in molecular biology. Seminar in human genetics.

Recommended literature:

1. Stanković Ž, Živanov-Čurlis J, Najman S: Biologija sa humanom genetikom (Osnovi citologije, genetike i embriologije), Kodeks, Niš 2001.
2. Najman S: Osnovi molekularne i humane genetike. Skripta. Savez studenata Medicinskog fakulteta u Nišu, Niš 2002.
3. Turnpenny P, Ellard S. Emerijevi osnovi medicinske genetike. Beograd. Datastatus; 2009.
4. Matić G, Savić Pavićević D. Molekularna biologija 1. NNK Internatinal, Beograd, 2011.
5. Najman S, Živanov-Čurlis J, Vukelić-Nikolić M. Molekularna i humana genetika – Praktikum sa radnom sveskom za studente medicine i stomatologije. Medicinski fakultet u Nišu, Niš, 2017.
6. Lecture handouts

Teaching methods:

- Theory: lectures
- Practice: microscopy, calculations and related tasks, interactive teaching (PCs) with practice log notebooks.
- seminars
- consultations

Required previous passed exams:

None

Grade: (max. 100)

Preexam obligations

- Credit: 0 – 10 points
- Test: 0 – 20 points
- Practice: 0 – 10 points

Final exam

- Written/oral exam: 0 – 60 points