



Study program: Doctoral Academic Studies in Biomedical Sciences		
Name of the subject: HUMAN MOLECULAR GENETICS		
Teacher(s): Karmen M. Stankov, Saša N. Vukmirović, Aleksandar J. Redžek, Deana D. Medić, Nataša S. Vučinić		
Status of the subject: elective		
Number of ECTS points: 20		
Condition: -		
Goal of the subject The main objective of the course is to enable the PhD students to acquire the knowledge and skills about the organization of the human genome, molecular genetics methods, molecular basis of the heritable diseases and application of molecular genetics methods in human diseases diagnostics, with the special emphasis on malignant, cardiovascular and metabolic diseases. PhD students will acquire the comprehensive and up-to-date knowledge about the new and modern methods and techniques applied in research of structure and variations of the human genome, ethical aspects in human genetics, stem cell and gene therapy will be explored, together with analysis of expression of genetic information and mutations of human genome, with the main aim to apply the acquired knowledge in research.		
Outcome of the subject PhD students will acquire the comprehensive knowledge about the methodology and application of molecular biology techniques in research of genetic basis of human diseases; practical knowledge on bioinformatics and technological advances in human genome research, including the human genome variations at the individual and population level; knowledge of ethical aspects in human genetics and stem cell and gene therapy; comprehensive knowledge of main techniques of molecular genetics in prenatal diagnostics and population genetics; basic and advanced knowledge on gene therapy and pharmacogenetics.		
Content of the subject <i>Theoretical lectures</i> 1. Human genome structure; 2. Classification of inherited diseases and inheritance patterns; 3. Personalized and translational medicine concept; 4. Regenerative medicine concept, application of stem cells in medicine; 5. Molecular markers in malignant, metabolic and cardiovascular diseases; 6. Chromosomal aberrations 7. Genetic polymorphisms, mutations, reparation, recombination; 8. Prenatal diagnostics; 9. Ethical aspects in human genetics; 10. Epigenetic mechanisms in diseases etiopatogenesis; 11. Pharmacogenetics – molecular basis and application in medicine; 12. Gene therapy. <i>Practical lectures</i> 1. Nucleic acids – structure and function; 2. Human chromosomes – karyotype analysis; 3. Inheritance patterns; 4. Pedigree analysis – symbols, pedigree construction and analysis; 5. Mon-Mendelian inheritance patterns; 6. Molecular genetics techniques; 7. Application of molecular genetics techniques in clinical medicine; 8. Molecular markers – proteomic markers, genetic markers, sequencing; 9. Pharmacogenetic biomarkers in medicine.		
Literature 1. Thompson & Thompson Genetics in Medicine, 8th Edition from Robert Nussbaum, Roderick McInnes, Huntington Willard. 2015. 2. Marks' Basic Medical Biochemistry. 5th edition, by Michael A. Lieberman and Allan Marks, 2017. 3. Grigorian Shamagian L, Madonna R, Taylor D, Climent AM, Prosper F, Bras-Rosario L, et al. Perspectives on Directions and Priorities for Future Preclinical Studies in Regenerative Medicine. Circ Res. 2019;124(6):938-51. 4. Stankov K, Stankov S, Katanić J. Genetic and epigenetic drug targets in myelodysplastic syndromes. Curr Pharm Design, 2017; 23: 135-69. 5. Stankov K, Benc D, Draskovic D. Genetic and epigenetic factors in etiology of diabetes mellitus type 1. Pediatrics. 2013; 132(6):1112-22. 6. Stankov K, Sabo A, Mikov M. Pharmacogenetic biomarkers as tools for pharmacoepidemiology of severe adverse drug reactions. Drug Dev Res. 2013;74:1-14. 7. Stankov K, Draskovic D, Mikov M. Ethical and legal aspects of oncogenomics. J BUON 2012;17(2):383-388.		
Number of active classes	Theory: 60	Practice: 45
Methods of delivering lectures. Theoretical and practical classes.		
Evaluation of knowledge (maximum number of points 100) activity during theoretical lectures: 20 practical lectures: 30 seminars: 10		

written exam: 20

oral exam: 20