

Course Unit Descriptor

Study Programme: PhD in Molecular Biology			
Course Unit Title: Genomics in genetic analyses			
Course Unit Code: DMB007			
Name of Lecturer(s): Prof. Mihajla Djan, PhD			
Type and Level of Studies: Doctoral studies			
Course Status (compulsory/elective): Elective			
Semester (winter/summer): winter/summer			
Language of instruction: English			
Mode of course unit delivery (face-to-face/distance learning): face-to-face			
Number of ECTS Allocated: 15			
Prerequisites: -			
Learning objectives The goal of the course is to acquire knowledge about modern technologies for testing the structure and function of the genome, as well as methods for processing and interpreting genomic data.			
Learning outcomes After successfully completing the pre-exam and exam obligations, the student can: - explain the principles of approaches in next generations sequencing (NGS) - understands and applies computational and statistical methods in the analysis of genomic data - based on the biological question, choose the technology and properly design the NGS experiment			
Syllabus <i>Theoretical instruction</i> Organization and structure of the genome. Historical overview of genome sequencing technologies. Library preparation and comparative review of next-generation sequencing technologies. RAD-Seq, RRLs, GBS, CroPS. Microarrays and transcriptomics. RNA-Seq. Gene expression and regulatory networks. Statistical methods in the analysis of genomic data. Comparative genomics. Metagenomics. Genomic databases. Manipulation of genomic data and files. Galaxy server. Methods of genome assembly (de novo assembly). Gene expression analysis (DeSeq2). Regulatory networks (Cytoscape). <i>Study research</i> Analysis, presentation and critical presentation of modern scientific results of works from the teaching units of theoretical teaching. Processing of the obtained data using adequate software packages.			
Literature 1. Arthur M. Lesk. 2017. Introduction to genomics. Oxford University Press. 2. Jonathan Pevsner. 2015. Bioinformatics and functional genomics. John Wiley & Sons. 3. scientific papers			
Weekly teaching load		Other:	
Lectures: 5	Exercises:	Other forms of teaching:	Student research: 5
Teaching methodology Theoretical teaching, teaching with the use of computers, mentoring work - consultations, "Journal Club" - presentation and discussion of scientific work in the field, Seminars - presentation of a given topic			
Grading method (maximal number of points 100)			
oral exam (60), practical work/seminar (40)			