Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Izbrana poglavja iz sodobnih molekularno-bioloških analiz**
Course title:	**Selected Topics in Modern Molecular Biology Analyses**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti		**1. ali 2.; 1st or 2nd**	**1. 2. ali 3. ; 1st, 2nd or 3rd**
Doctoral Study Ecological Sciences			

Vrsta predmeta / Course type	Izbirni/Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
5	**-**	**5**	**-**	**-**	**140**	**5**

Nosilec predmeta / Lecturer:	Janja TRČEK

Jeziki / Languages:	**Predavanja / Lectures:**	**Slovenski Slovene**
	Vaje / Tutorial:	**Slovenski/Slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Osnovanja znanja iz molekularne biologije na ravni drugostopenjskega programa.	Knowledge of basic molecular biology analyses at master level.

Vsebina:	**Content (Syllabus outline):**
Obravnavana bodo izbrana poglavja iz naslednjih sklopov: • Principi klasične genetike • Podvojevanje DNA in rekombinacije • Molekularni mehanizmi izražanja genov • Spremembe genetskega materiala • Kromosomi • Osnovne molekularno-biološke metode • Genetske analize genoma • Evolucija genomov • Genetska kontrola razvoja večceličnih organizmov • Genetika bakterij in njihovih virusov • Genomi kloroplastov in mitohondrijska DNA • Molekulski pristopi k študiju biodiverzitete, filogenije, populacijske genetike in ekologije • Evolucija in filogenija • Baze podatkov in osnove bioinformatike pri analizi molekularno-bioloških podatkov	Selected topics in the following issues will be discussed: • Principles of classical genetics • DNA replication and recombination • Molecular mechanisms of gene expression • Modifications of genetic material • Chromosomes • Basic molecular genetic methods • Genetic analyses of the genomes • The evolution of genomes • Genetic control of development in multicellular organisms • Genetics of bacteria and their viruses • Chloroplast genomes, mitochondrial DNA • Molecular approaches in biodiversity and phylogenetic studies, population genetics and ecology • Evolution and phylogenetics • Databases and fundamentals of bioinformatics in the analyses of molecular biology data

Temeljni literatura in viri / Readings:

• Lodish H, Berk A, Kaiser CA, Monty Krieger s sod. 2012. Molecular Cell Biology. New York: WH Freeman and Company.
• Conner, JK in Hartl DL 2004. A primer of ecological genetics. Sinauer Associates, Inc. Publishers Sunderland, Massachusetts.
• Hartwell L, Hood L, Goldberg M, Reynolds A, Silver L 2010. Genetics: From genes to genomes. McGraw-Hill, Boston.
• Nei M in Kumar S. 2000. Molecular Evolution and Phylogenetics. Oxford University Press, Inc., New York.
• Ausubel MF, Brent R, Kingston RE s sod. 2011. Current Protocols in Molecular Biology. John Wiley & Sons, Inc.

Cilji in kompetence:	**Objectives and competences:**
• Podrobno razložiti spoznanja o genetskih dogajanjih v celici na molekulskem nivoju • Podrobno razložiti metode analize genov, genomov in proučevanja izražanja genov znotraj kompleksnih biotskih sistemov ter razpravljati o novih tehnologijah, kot so genomika in informacijske vede, ki omogočajo izčrpno analizo celotnih sklopov genov in njihovega izražanja v organizmu • Podrobno razložiti koncept genetske	• To give an advanced review of genetic events in the cell at the molecular level • Explain in detail tools for analyzing genes, genomes and gene expression within complex biotic systems and to discuss the new technologies such as genomics and the information science that allow a comprehensive analysis of the entire gene set and its expression in an organism • Explain in detail the concept of genetic unity

enotnosti živih bitij in podati sintezo informacij iz različnih organizmov v splošnem modelu, ki lahko razloži številne biotske sisteme • Podrobno razložiti molekulske mehanizme, ki so omogočili razvoj različnih biotskih sistemov • Omogočiti poglobljeno razumevanje molekularno-bioloških tehnik in analiz, ki se uporabljajo v klasičnih bioloških disciplinah in pojasniti vlogo molekularne biologije v moderni biologiji, vključno z njenimi vplivi na področjih biodiverzitete, filogenije, populacijske genetike in ekologije	of living beings and the synthesis of information from different organisms into coherent models that explain many biotic systems • Explain in detail molecular mechanism which enabled the evolution of biotic systems • To enable advanced understanding of molecular biology techniques and analyses, used in classical biologicaldisciplines, and to give information about the role of molecular biology within modern biology, including its impact on the fields of biodiversity, phylogenetics, population genetics and ecology

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Študenti dobijo izčrpen pregled nad celotnim področjem, od klasične in molekularne genetike do molekularne biologije postgenomske ere in nad vplivi razvoja sodobnih molekularno-bioloških analiz na klasične biološke discipline kot so biodiverziteta, filogenija, populacijske genetika in ekologija. • Podrobno obvladajo številna sodobna molekularno-biološka in bioinformatska orodja **Prenesljive/ključne spretnosti in drugi atributi:** • Praktično znanje iz številnih tehnih in metod molekularne biologije • Kritična presoja moralnih in etičnih problemov, povezanih z znanstvenim napredkom na genetskem področju	**Knowledge and understanding:** • Students get a comprehensive overview of the field of classical and molecular genetics, molecular biology of post genomic era with the impact of modern molecular biology analyses on classical biology disciplines such as biodiversity, phylogenetics, phylogeography, population genetics and ecology. • They are able to use advancely numerous molecular biology- and bioinformatics tools **Transferable/Key Skills and other attributes:** • Practical knowledge of various techniques and methods in molecular biology • Critical appreciation of the moral and ethical problems related to scientific advances in genetics

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje	• Lectures • Laboratory excersises

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
• Kolokvij	30 %	• Partial exam
• Seminarska naloga	30 %	• Seminar essay
• Pisni izpit	40 %	• Written exam

Reference nosilca / Lecturer's references:

1. **Trček J.** 2014. Plasmid analysis of high acetic acid-resistant bacterial strains by two-dimensional agarose gel electrophoresis and insights into the phenotype of plasmid pJK2-1. Ann. Microbiol. in press.
2. **Trček J.,** Matsushita K. 2013. A unique enzyme of acetic acid bacteria, PQQ-dependent alcohol dehydrogenase is also present in *Frateuria aurantia*. Appl. Microbiol. Biotechol. 97, 7369-7376.
3. Slapšak N., Cleenwerck I., De Vos P., **Trček J.** 2013. *Gluconacetobacter maltaceti*, a novel vinegar producing acetic acid bacterium. Syst. Appl. Microbiol. 36, 17-21.
4. **Trček J.**, Fuchs T.M., Trülzsch K. 2010. Analysis of *Yersinia enterocolitica* invasin expression *in vitro* and *in vivo* using a novel *luxCDABE* reporter system. Microbiology, 156, 2734-2745.
5. Bresolin G., **Trček J.**, Scherer S., Fuchs T.M. 2008. Presence of a functional flagellar cluster Flag-2 and low-temperature expression of flagellar genes in *Yersinia enterocolitica* W22703. Microbiology 154, 196-206.