Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Osnove molekularne biologije**
Course title:	*Basics of molecular biology*

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna kemija, 1. stopnja		**2. ali 3.**	**zimski ali poletni**
Educational Chemistry, 1st degree			

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

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	**15**				**150**	**6**

Nosilec predmeta / Lecturer:	Uroš Potočnik

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
/	/

Vsebina:	**Content (Syllabus outline):**
• DNA struktura in lastnosti, replikacija (prokarionti, eukarionti), rekombinacija DNA, DNA popravljalni mehanizmi, DNA mutacije, struktura kromosomov • RNA struktura in lastnosti, vrste RNA molekul in funkcije, transkripcija (prokarionti, eukarionti), postranskripcijske modifikacije • Struktura proteinov, sinteza proteinov,	▪ DNA structure and characteristics, replication (prokaryotes, eukaryotes), recombination, repair and mutations,, structure and function of genes and chromosomes, ▪ RNA structure characteristics: role of different types of RNA, transcription (prokaryotes, eukaryotes), post transcription modification

posttranslacijske modifikacije proteinov, zvijanje proteinov, transport proteinov • Regulacija proteinske sinteze: regulacija ekspresije genov pri prokariontih, pri bakteriofagih, pri evkariotskih organizmih (enoceličnih, multicelularnih, povezava z embrionalnim razvojem), regulacija na ravni translacije in posttranslacijska regulacija, • Molekularni vidiki embrionalnega razvoja • Celična delitev (mejoza, mitoza), • Celični cikel, proliferacija, diferenciacija celic, apoptoza • Povezovanje celic v tkiva, komunikacija med celicami, signalne poti, receptorji, hormoni • Virusi, HIV, SARS, DNA diagnostika pri infekcijskih boleznih • Osnove molekularne genetike, genetske bolezni	▪ Protein structures, synthesis of proteins, translation, posttranslational modifications, protein folding, protein trafficking ▪ Regulation of protein synthesis: transcriptional regulation of gene expression,, regulation of translation, posttranslational regulation ▪ Embryonic development-molecular view ▪ Cell division (meiosis, mitosis) ▪ Cell cycle: proliferation, differentiation, apoptosis ▪ Integration of cells into tissues, communication between cells, signal transduction, receptors, hormone signaling ▪ Immune system ▪ Viruses :HIV, SARS, Avian influence, DNA diagnostics and infection diseases ▪ Basic molecular genetics, genetic diseases

Temeljni literatura in viri / Readings:

- B. ALBERTS et al.: *Molecular biology of the cell., 4th Ed.*, Gerland Publish, Inc., New York, 2002
- LODISH H., Baltimore D., Berk A., Zipursky S.L., Matsudaira P., Darnell J.: Molecular Cell Biology, 5th Ed., Scientific American Books, Freeman and Co., New York, 2004

Cilji in kompetence:	**Objectives and competences:**
Predmet bo nudil študentom osnovno razumevanje in celostni pristop k osnovnim molekularnim procesom v celici, tkivih, organih in celotnem organizmu. Poudarek bo na prenosu DNA informacije za sintezo proteinov.	Students will understand basic molecular mechanisms in the cell, how cells are organized in tissues, organs and whole organisms. The focus will be on transfer of genomic information to synthesis of proteins.

Predvideni študijski rezultati:	**Intended learning outcomes:**
<u>Znanje in razumevanje:</u> - osnovne molekularne procese v celici	Knowledge and Understanding: - basic molecular processes in the cell

Metode poučevanja in učenja:	Learning and teaching methods:
• Predavanja • Laboratorijske vaje • Individualno delo	• Lectures • Laboratory excersises • Individual work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
• Pisni • ustni izpit	60% 40%	• Written • oral exam

Reference nosilca / Lecturer's references:

1. PERIN, Petra, POTOČNIK, Uroš. Polymorphisms in recent GWA identified asthma genes CA10, SGK493, and CTNNA3 are associated with disease severity and treatment response in childhood asthma. *Immunogenetics*, ISSN 0093-7711, 2014, vol. 66, issue 3, str. 143-151, doi: 10.1007/s00251-013-0755-0. [COBISS.SI-ID 17472790]

2. LIU, Jimmy Z, MITROVIČ, Mitja, et al., POTOČNIK, Uroš (sodelavec pri raziskavi), et al. Dense genotyping of immune-related disease regions identifies nine new risk loci for primary sclerosing cholangitis. *Nature genetics*, ISSN 1061-4036, 2013, vol. 45, no. 6, str. 670-675, ilustr. http://www.nature.com/ng/journal/vaop/ncurrent/full/ng.2616.html, doi: 10.1038/ng.2616. [COBISS.SI-ID 512280376]

3. Cross-Disorder Group of the Psychiatric Genomics Consortium, , et al., MITROVIČ, Mitja (sodelavec pri raziskavi), POTOČNIK, Uroš (sodelavec pri raziskavi), et al. Genetic relationship between five psychiatric disorders estimated from genome-wide SNPs. *Nature genetics*, ISSN 1061-4036, 2013, vol. 45, no. 9, str. 984-994, ilustr., doi: 10.1038/ng.2711. [COBISS.SI-ID 512406840]

4. BERCE, Vojko, PINTO KOZMUS, Carina, POTOČNIK, Uroš. Association among ORMDL3 gene expression, 17q21 polymorphism and response to treatment with inhaled corticosteroids in children with asthma. *Pharmacogenomics journal*, ISSN 1470-269X, Dec. 2013, vol. 13, issue 6, 523-529. http://www.nature.com/tpj/journal/vaop/ncurrent/full/tpj201236a.html, doi: 10.1038/tpj.2012.36. [COBISS.SI-ID 4406079]

5. BEAUDOIN, Méllisa, GOYETTE, Philippe, BOUCHER, Gabrielle, LO, Ken Sin, RIVAS, Manuel A, STEVENS, Christine, ALIKASHANI, Azadeh, LADOUCEUR, Martin, ELLINGHAUS, David, TÖRKVIST, Leif, GOEL, Gautam, LAGACÉ, Caroline, ANNESE, Vito, BITTON, Alain, BEGUN, Jakob, BRANT, Steve R., BRESSO, Francesca, CHO, Judy, DUERR, Richard H., HALFVARSON, Jonas, MCGOVERN, Dermot P. B., RADFORD-SMITH, Graham, SCHREIBER, Stefan, SCHUMM, Philip L., SHARMA, Yashoda, SILVERBERG, Mark S., WEERSMA, Rinse K., D'AMATO, Mauro, VERMEIRE, Severine, FRANKE, Andre, LETTRE, Guillaume, XAVIER, Ramnik J., DALY, Mark J., RIOUX, John, et al., POTOČNIK, Uroš (sodelavec pri raziskavi), MITROVIČ, Mitja (sodelavec pri raziskavi), et al. Deep resequencing of GWAS loci identifies rare variants in CARD9, IL23R and RNF186 that are associated with ulcerative

colitis. *PLOS genetics*, ISSN 1553-7404, sep. 2013, vol. 9, no. 9, str. 1-11, ilustr. http://www.plosgenetics.org/article/info%3Adoi%2F10.1371%2Fjournal.pgen.1003067. [COBISS.SI-ID 76913409]