2022/2023

Univerza v Mariboru

Medicinska fakulteta

UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION	
Predmet:	**Izbrane vsebine in novosti v molekularni biologiji**
Subject Title:	**Selected Topics and Novelties in Molecular Biology**

Študijski program in stopnja Study programme and cycle	Študijska smer Study option	Letnik Year of study	Semester Semester
Dentalna medicina/Dental Medicine 2. stopnja/2nd cycle		**1**	**1 ali 2**

Vrsta predmeta / Course type Izbirni/Elective

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Clinical training	Druge oblike študija Other forms of study	Samost. delo Individual work	ECTS
5	**40**				**45**	**3**

Nosilec predmeta / Lecturer: **red. prof. dr. Uroš Potočnik**

Jeziki / Languages:	**Predavanja / Lecture:**	slovenščina/slovene
	Vaje / Tutorial:	

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

Vsebina:	**Content (Syllabus outline):**
Molekularna biologija embrionalnega razvoja Vloga telomerazne aktivnosti pri staranju in raku Biološka zdravila: razdelitev, glavna terapevtska področja, imunogenost, proizvodnje tehnologije za biološka zdravila RNA interferenca (RNAi): molekularna vloga celici, uporaba RNAi tehnologije v funkcijski genomiki in kot zdravilo; Avtofagija: vloga v celici, signalne poti povezane z avtofagijo, povezava z boleznimi, metode za spremljanje Cirkadijski ciklus: regulacija, vključeni geni, bolezni povezane z motnjami cirkadijskega cikla; nekodirajoče RNA:razdelitev, vloga v normalnih in patoloških procesih;	Molecular biology of embryonic development The role of telomerase activity in aging and cancer Biological drugs: classification, main therapeutic areas, immunogenicity, production technology for biological drugs The role of RNA interference (RNAi) in cell; using of RNAi technology in functional genomics and therapy Avtofagy; the role in cell, signal pathways that regulate autophagy, autophagy associated diseases, assays for monitoring of autophagy; Circadium cycle: regulation, molecular pathways and genes; associated diseases, molecular targets for therapeutic intervention; non-coding RNAs: the role in physiological processes and pathogenesis;

analiza mrež molekularno bioloških in signalnih poti z uporabo genske ontologije in bioinformatskih orodij (Cytoscape) Celični cikel, proliferacija, diferenciacija celic, apoptoza Povezovanje celic v tkiva, komunikacija med celicami, signalne poti, receptorji, hormoni metode in eksperimentalne tehnike v molekularni biologiji: izolacija bioloških materialov (DNA, RNA, proteinov) iz kliničnih vzorcev (kri, biopsije, tkivo-resektati) in celičnih kultur, izolacija plazmidne DNA, gelska elektroforeza, pomnoževanje DNA z verižno reakcijo z encimom polimerazo (PCR), analiza genske ekspresije z metodo PCR v realnem času (Taqman), hibridizacija odtisa (southern, northern, western), konstrukcija cDNA in genomskih knjižnic Funkcionalni celični modeli Vloga molekularne biologije v sodobni družba: etični, sociološki in ekonomski vidiki Molekularna biologija nepravilnosti zob in dlesni.	Analysis of molecular biology pathways and networks using gene ontology databases and bioinformatics tools (Cytoscape) Cell cycle: proliferation, differentiation, apoptosis Integration of cells into tissues, communication between cells, signal transduction, receptors, hormone signaling Methods and experimental techniques in molecular biology: isolation of biological molecules (DNA, RNA, proteins) from clinical samples (blood, biopsy, tissue, resection specimens) and cell cultures; plasmid DNA isolation, Polymerase Chain Reaction (PCR), gene expression analysis using Real time PCR (Taqman); hybridization and blotting (southern, western, northern); cDNA and genomic libraries Functional cell models Molecular biology and society: ethical and economical aspects Molecular biology of dental and gum pathology.

Temeljni literatura in viri / Textbooks:

1. B. ALBERTS et al.: Molecular biology of the cell., 5th Ed., Gerland Publish, Inc., New York, 2008
2. Trent, Ronald J. : Molecular medicine : genomics to personalized healthcare; 4th ed. - Amsterdam [etc.] : Elsevier, ISBN 978-0-12-381451-7; 2012
3. 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
4. Tekoča periodika/Scientific research and review papers

Cilji:	**Objectives:**
Predmet bo nudil študentom poglobitev razumevanja bistvenih molekularnimi in biološkimi procesov v celici, tkivihih, organih in celotnem organizmu. Poseben povdarek bo na razumevanju patoloških sprememb v molekularnih procesih pri nastanku, razvoju in zdravljenju bolezni. Predstavljene bodo osnovne metode in eksperimentalne tehnike v molekularni biologiji in molekularni patologiji ter njihova uporaba pri raziskavah in preiskavah molekularnih označevalcev v diagnostiki, prognozi, načrtovanju novih zdravil in individualiziranem zdravljenju	Student will have deep understanding of molecular and biological processes in cells, tissues, organs and whole human organism during health and disease. The focus will be on molecular mechanisms during disease development and treatment. Student will learn most important molecular biology and molecular pathology laboratory methods for diagnostics, biomarker discovery, novel drug development and individualized treatment based on patients genetic makeup.
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • osnovnimi molekularnimi in biološkimi procesi v celici, tkivih, organih in celotnem organizmu v zdravju in bolezni Prenesljive/ključne spretnosti in drugi atributi: laboratorijske metode in eksperimenti v biomedicini	Knowledge and Understanding: • molecular and biological processes in cells, tissues, organs and whole human organism during health and disease Transferable/Key Skills and other attributes: laboratory methods and experimental techniques in biomedicine
Metode poučevanja in učenja:	**Learning and teaching methods:**

Predavanje Seminar	Lectures Seminars

Načini ocenjevanja:	**Delež (v %) / Weight (in %)**	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
seminar	**40 %**	seminar
pisni izpit	**60 %**	written exam
ŠTUDIJSKE OBVEZNOSTI ŠTUDENTOV: -študenti napišejo seminar na izbrano tematiko in ustno predstavijo seminar s kratkim predavanjem -pisni izpit		ACADEMIC OBLIGATIONS OF STUDENTS: -students should write an essay on selected topic and give oral presentation (seminar) -written exam
POGOJI ZA PRISTOP K POSAMEZNEMU PREVERJANJU ZNANJA: Opravljen seminar je pogoj za pristop k pisnemu izpitu.		REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING: Students should complete seminar in order to approach to the written exam.

Reference nosilca / Lecturer's references:

JOSTINS, Luke, MITROVIČ, Mitja, POTOČNIK, Uroš, et al. Host-microbe interactions have shaped the genetic architecture of inflammatorybowel disease. **Nature,** ISSN 0028-0836. [Print ed.], 2012, vol. 491, no. 7422, str. 119-124, doi: 10.1038/nature11582. [COBISS.SI-ID 512230968], [JCR, SNIP, WoS do 5. 6. 2016: št. citatov (TC): 945, čistih citatov (CI): 940, čistih citatov na avtorja (CIAu): 46.32, normirano št. čistih citatov (NC): 374, Scopus do 5. 5. 2016: št. citatov (TC): 986, čistih citatov (CI): 979, čistih citatov na avtorja (CIAu): 48.25, normirano št. čistih citatov (NC): 1558], SCI impact factor=36.28

CLEYNEN, Isabelle, BOUCHER, Gabrielle, JOSTINS, Luke, SCHUMM, Philip L., ZEISSIG, Sebastian, AHMAD, Tariq, ANDERSEN, Vibeke, ANDREWS, Jane M, ANNESE, Vito, BRAND, Stephan, et al., MITROVIČ, Mitja (sodelavec pri raziskavi), POTOČNIK, Uroš (sodelavec pri raziskavi), et al. Inherited determinants of Crohn's disease and ulcerative colitis phenotypes : a genetic association study. **The Lancet**, ISSN 1474-547X. [Online ed.], 2016, vol. 387, iss. 10014, str. 156-167. http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)00465-1/abstract, doi: 10.1016/S0140-6736(15)00465-1. [COBISS.SI-ID 512567352], [JCR, SNIP, WoS do 1. 6. 2016: št. citatov (TC): 3, čistih citatov (CI): 3, čistih citatov na avtorja (CIAu): 0.13, normirano št. čistih citatov (NC): 1, Scopus do 1. 6. 2016: št. citatov (TC): 4, čistih citatov (CI): 4, čistih citatov na avtorja (CIAu): 0.17, normirano št. čistih citatov (NC): 1];
SCI impact factor= 45.22

HUANG, Hailiang, FANG, Ming, JOSTINS, Luke, UMIĆEVIĆ MIRKOV, Maša, BOUCHER, Gabrielle, ANDERSON, Carl A., ANDERSEN, Vibeke, CLEYNEN, Isabelle, CORTES, Adrian, CRINS, François, et al., MITROVIČ, Mitja (sodelavec pri raziskavi), POTOČNIK, Uroš (sodelavec pri raziskavi), et al. Fine-mapping inflammatory bowel disease loci to single-variant resolution. **Nature**, ISSN 1476-4687. [Online ed.]., 2017 http://www.nature.com/nature/journal/vaop/ncurrent/full/nature22969.html?WT.feed_name=subjects_computational-biology-and-bioinformatics, doi: 10.1038/nature22969. [COBISS.SI-ID 512723768],
SCI impact factor= 38.14

RIVAS, Manuel A, MITROVIČ, Mitja, POTOČNIK, Uroš, et al. Deep resequencing of GWAS loci identifies independent rare variants associated with inflammatory bowel disease. Nature genetics, ISSN 1061-4036, 2011, vol. 43, no. 11, str. 1066-1073, doi: 10.1038/ng.952. [COBISS.SI-ID 15421974], [JCR, SNIP, WoS do 6. 6. 2016: št. citatov (TC): 280, čistih citatov (CI): 279, čistih citatov na avtorja (CIAu): 12.61, normirano št. čistih citatov (NC): 77, Scopus do 6. 5. 2016: št. citatov (TC): 299, čistih citatov (CI): 297, čistih citatov na avtorja (CIAu): 13.42, normirano št. čistih citatov (NC): 82]
SCI impact factor=35.53

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], [JCR, SNIP, WoS do 4. 2. 2016: št. citatov (TC): 6, čistih citatov (CI): 5, čistih citatov na avtorja (CIAu): 1.67, normirano št. čistih citatov (NC): 2, Scopus do 4. 12. 2015: št. citatov (TC): 8, čistih citatov (CI): 7, čistih citatov na avtorja (CIAu): 2.33, normirano št. čistih citatov (NC): 3]; SCI impact factor= 5.513

KODER, Silvo, REPNIK, Katja, FERKOLJ, Ivan, PERNAT DROBEŽ, Cvetka, SKOK, Pavel, WEERSMA, Rinse K., POTOČNIK, Uroš. Genetic polymorphism in ATG16L1 gene influences the response to adalimumab in Crohn's disease patients. Pharmacogenomics, ISSN 1462-2416, 2015, vol. 16, no. 3, str. 191-204, doi: 10.2217/pgs.14.172. [COBISS.SI-ID 512474168], [JCR, SNIP, WoS do 25. 6. 2017: št. citatov (TC): 9, čistih citatov (CI): 7, čistih citatov na avtorja (CIAu): 1.00, Scopus do 27. 6. 2017: št. citatov (TC): 9, čistih citatov (CI): 7, čistih citatov na avtorja (CIAu): 1.00]; SCI impact factor= 2.71