Univerza v Mariboru
University of Maribor

Medicinska fakulteta
Faculty of Medicine

UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION	
Predmet:	Izbrane vsebine in novosti v molekularni biologiji
Subject Title:	Selected topics and novelties in molecular biology

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Splošna medicina General medicine – EMŠP		1	**2**

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
5	40				45	**3**

Nosilec predmeta / Lecturer: Izred. prof. dr. Uroš Potočnik

Jeziki / Languages:		
	Predavanja / Lecture:	Slovenski/Slovene
	Vaje / Tutorial:	

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

Prerequisits:

Vsebina:

DNA struktura in lastnosti, replikacija (prokarionti, eukarionti), rekombinacija DNA, DNA popravljalni mehanizmi, DNA mutacije, struktura in funkcija genov in kromosomov
RNA struktura in lastnosti, vrste RNA molekul in funkcije, transkripcija (prokarionti, eukarionti), postranskripcijske modifikacije
Struktura proteinov, sinteza proteinov, 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,
Embrionalni razvoj
Celični cikel, proliferacija, diferenciacija

Content (Syllabus outline):

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
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
Cell division (meiosis, mitosis)
Cell cycle: proliferation, differentiation, apoptosis
Integration of cells into tissues, communication

celic, apoptoza Povezovanje celic v tkiva, komunikacija med celicami, signalne poti, receptorji, hormoni Imunski sistem in avtoimunske bolezni Virusi, HIV, SARS, DNA diagnostika pri infekcijskih boleznih Molekularna patologija: molekularni mehanizmi vključeni v nastanek bolezni, od bolezni do gena 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, Rekombinantna DNA tehnologija, kloniranje človekovih genov Monogenske genetske bolezni, kompleksne genetske bolezni, Molekularna biologija raka: onkogeni, tumorsko zaviralni geni, dedne oblike, molekulska diagnostika in zdravljenje, biološka zdravila Vloga molekularne biologije v sodobni družba: etični, sociološki in ekonomski vidiki	between cells, signal transduction, receptors, hormone signaling Immune system Viruses :HIV, SARS, Avian influence, DNA diagnostics and infection diseases Molecular pathology: from disease to gene 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 Recombinant DNA technology, cloning of human genes Monogenic (Mendelien) and complex diseases Molecular biology of cancer:oncogenes, tumor suppressor genes, hereditary cancer, molecular diagnostics and treatment, biological drugs Molecular biology and society: ethical and economical aspects

Temeljni literatura in viri / Textbooks:

1. B. ALBERTS et al.: *Molecular biology of the cell., 5th Ed.*, Gerland Publish, Inc., New York, 2008
2. EPSTEIN RJ: Human molecular biology, An Introduction to the Molecular Basis of Health and Disease; Cambridge University Press, Cambridge, 2002
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. STRACHAN T and READ AP: Human Molecular genetics, Gerland Publish, Inc., New York, 3rd ed., 2004Liciano J. (ed.): Pharmacogenomics, The Search for Individualized Therapies, John Wiley&Sons, 2002R.J.M

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 • seminar

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) seminar Izpit	 **40%** **60 %**	Type (examination, oral, coursework, project): seminar Exam