



Univerza v Mariboru

Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Ime predmeta:	Biokemija							
Course title:	Biochemistry							
Študijski program in stopnja Study programme and cycle	Študijska smer Study option			Letnik Year of study	Semester Semester			
Biomedicinska tehnologija/3. stopnja				1	1 ali 2			
Biomedical Technology/3rd Degree								
Vrsta predmeta (obvezni ali izbirni) / Course type (compulsory or elective)				Temeljni Basic				
Univerzitetna koda predmeta / University course code:								
Predavanja Lectures	Seminar Seminar	Vaje Tutorial			Klinične vaje Clinical training	Druge oblike študija Other forms of study	Samost. delo Individual work	ECTS
20	40	15					195	9
		AV	LV	RV				
Nosilec predmeta / Course coordinator:		Doc. Helena Sabina ČELEŠNIK, Ph.D. (ZDA)						
Jeziki /Languages:		Predavanja / Lectures:		slovenščina / slovenian				
		Vaje / Tutorial:		slovenščina / slovenian				
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites for enrolling in the course or for performing study obligations:				
Vsebina (kratek pregled učnega načrta):				Content (syllabus outline):				
Biomolekule. Metode izolacije in kvantitativnega ter kvalitativnega določanja strukture in funkcije beljakovin: elektroforeza, MALDI-MS, proteomika in metabolomika, biološki modeli. Imunocito(histo)kemijske metode: temeljni principi in aplikacije. Napredne metode za določevanje izražanja genov (RT-qPCR, mikromreže, next generation sequencing). Uporaba biokemijskih tehnik v raziskovanju. Napake v strukturi beljakovin in z njimi povezane bolezni. Encimi: Regulacija in klinična aplikacija: plazemski encimi, merjenje encimske aktivnosti, serumski markerji pri poškodbah tkiva, encimi kot analitični in terapevtski reagenti. Heteropolisaharidi: glikoproteini in glikolipidi.				Biomolecules. Methods of isolation and determination of proteins: electrophoresis, MALDI-MS, proteomics and metabolomics, biological models. Imunocyto(histo)chemistry: principles and applications. Advanced methods for measuring gene expression (RT-qPCR, microarrays, next generation sequencing). Use of biochemical techniques in research. Protein folding and associated diseases. Enzymes: Regulation and clinical applications: enzymes from plasma, measurements of enzyme activity, serum markers in the diagnosis of tissue damage, enzymes as analytical reagents and therapeutic agents. Heteropolysaccharides: glycoproteins and glycolipids.				

<p>Gastrointestinalna digestija in absorpcija. gastrointestinalni hormoni, termični učinek hrane. Izbrane vsebine iz metabolizma ogljikovih hidratov.</p> <p>Lipidi: fosfolipidi in glikolipidi v klinični medicini, holesterol in žolčne kisline, plazemski lipoproteini in z njimi povezane napake v organizmu. Izbrane vsebine iz metabolizma lipidov.</p> <p>Metabolna homeostaza: metabolična vloga organov, homeostaza ogljikovih hidratov, homeostaza lipidov.</p> <p>Homeostaza beljakovin.</p> <p>Nepravilnosti v metabolni homeostazi.</p> <p>Celično signaliziranje, hormoni in rastni faktorji.</p> <p>Endokrini metabolizem – primeri organskih sistemov.</p> <p>Molekularna imunologija: molekule in kemijski procesi v imunskem sistemu, protitelesa, interferoni in citokini.</p> <p>Biokemija raka.</p> <p>Izbrane vsebine iz metabolizma vitaminov in njihovih nadomestkov.</p>	<p>Gastrointestinal digestion and absorption, gastrointestinal hormones, thermic effect of food. Selected topics in carbohydrate metabolism.</p> <p>Lipids: phospholipids and glycolipids in clinical medicine, cholesterol and bile acids, plasma lipoprotein associated disorders. Selected topics in lipid metabolism.</p> <p>Metabolic homeostasis: organs, carbohydrate and lipid homeostasis.</p> <p>Protein homeostasis.</p> <p>Abnormalities in homeostasis.</p> <p>Cell signaling, hormones and growth factors.</p> <p>Endocrine metabolism – organic systems.</p> <p>Molecular immunology: molecules and chemical processes in the immune system, antibodies, interferons and cytokines.</p> <p>Biochemistry of cancer.</p> <p>Selected topics from vitamin metabolism.</p>
<p>Temeljni literatura in viri / Reading materials:</p>	
<ul style="list-style-type: none"> – Lehninger principles of biochemistry. cop. 2017, 7th ed. /edited by Nelson, David Lee, 1942- ; Cox, Michael M. – Modern experimental biochemistry/edited by Rodyner Boyer, 2002, ISBN: 0-8053-3111-5 – The big picture: medical biochemistry Janson, Lee W.; Tischler, Marc E. New York : McGraw-Hill Medical, cop. 2012 – Textbook of Biochemistry with clinical correlations, New York: J. Wiley. Devlin, T.M. (Ed.) 2011, ISBN: 978-0-470-28173-4 – Molecular interactions between microorganisms and cells, Hacker, J. and Heesemann, J. (Ed.)2002, ISBN: 0-471-17846-2 	
<p>Cilji in kompetence:</p>	<p>Objectives and competences:</p>
<p>Spoznati poglobljene vsebine iz strukture in funkcije biomolekul.</p> <p>Povezati strukturo in funkcijo biomolekul v biokemičnih procesih človeškega telesa ter povezati napake v strukturi in funkciji s pojavom bolezenskih stanj.</p> <p>Spoznati moderne metode eksperimentalne biokemije in njihovo uporabo.</p>	<p>To get familiar in depth with interactions between structure and function of biomolecules.</p> <p>To achieve a synthesis of structure and function of biochemical processes in a human body, as well as correlate disorders in structure and function with the clinical medicine.</p> <p>To get familiar with modern principles of experimental biochemistry and its applications.</p>
<p>Predvideni študijski rezultati:</p> <p>Poglobljeno razumevanje biokemijskih procesov in delovanja biomolekul. Spoznavanje sodobnih biokemijskih raziskovalnih pristopov ter razvijanje znanstveno-raziskovalnega razmišljanja.</p>	<p>Intended learning outcomes:</p> <p>In-depth understanding of biochemical processes and the function of biomolecules. Familiarization with modern biochemical research approaches and development of scientific research thinking.</p>
<p>Znanje in razumevanje:</p> <p>Poglobljeno temeljno teoretično in praktično znanje na področju moderne eksperimentalne biokemije.</p>	<p>Knowledge and understanding:</p> <p>In-depth knowledge of fundamental theoretical and practical principles of modern experimental biochemistry.</p>

Prenosljive/ključne spretnosti in drugi atributi: teoretično in praktično znanje kot osnova za specializirane predmete (predmete izbirnih vsebin) ter za doktorsko disertacijo.		Transferable/key competences and other abilities: Theoretical and practical knowledge as well as skills in the use and interpretation of modern experimental methods as a basis of specialized subjects (chosen subjects) and for a doctoral thesis.	
Metode poučevanja in učenja: Predavanja Seminarji Vaje		Learning and teaching methods: Lectures Seminars Tutorial	
Načini ocenjevanja:		Delež (v %) / Share (in %)	Assessment methods:
Način (pisni izpit, ustno izpraševanje, naloge, projekt)			Method (written or oral exam, coursework, project):
Pisni izpit		50 %	Written exam
Ustni izpit		20 %	Oral exam
Seminarska naloga in opravljene laboratorijske vaje		30 %	Project work and accomplished laboratory practical's
Reference nosilca / Course coordinator's references:			
<p>ČELEŠNIK, Helena Sabina, TANŠEK, Anja, TAHIROVIČ, Aneja, VIŽINTIN, Angelika, MUSTAR, Jernej, VIDMAR, Vita, DOLINAR, Marko. Biosafety of biotechnologically important microalgae : intrinsic suicide switch implementation in cyanobacterium <i>Synechocystis</i> sp. PCC 6803. <i>Biology open</i>, ISSN 2046-6390, 2016, vol. 5, iss. 4, str. 519-528, ilustr. http://bio.biologists.org/content/5/4/519, doi: 10.1242/bio.017129. [COBISS.SI-ID 1536856259], [JCR, SNIP, WoS do 9. 8. 2021: št. citatov (TC): 9, čistih citatov (CI): 7, čistih citatov na avtorja (CIAu): 1.00, Scopus do 11. 3. 2021: št. citatov (TC): 11, čistih citatov (CI): 9, čistih citatov na avtorja (CIAu): 1.29]kategorija: 1A2 (Z, A1/2); uvrstitev: SCI, Scopus, MBP; tip dela je verificiral OSICB točke: 12.95, št. avtorjev: 7</p> <p>ČELEŠNIK, Helena Sabina, BÜDEFELD, Tomaž, ČIZMAREVIČ, Bogdan, ŠVAGAN, Matija, POTOČNIK, Uroš. MIR137/MIR2682 locus is associated with perineural invasiveness in head and neck cancer. <i>Journal of oral pathology & medicine</i>, ISSN 1600-0714. [Online ed.], First published: 19 March 2021, str. 1-4, doi: 10.1111/jop.13174. [COBISS.SI-ID 56567811], [JCR, SNIP, WoS do 9. 8. 2021: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.20, Scopus do 1. 9. 2021: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0]kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCI, Scopus, MBP; tip dela še ni verificiran točke: 20.3, št. avtorjev: 5</p> <p>ČELEŠNIK, Helena Sabina, POTOČNIK, Uroš. Peripheral blood transcriptome in breast cancer patients as a source of less invasive immune biomarkers for personalized medicine, and implications for triple negative breast cancer. <i>Cancers</i>, ISSN 2072-6694, 2022, vol. 14, issue 3, str. [1]-21, ilustr. https://www.mdpi.com/2072-6694/14/3/591, https://doi.org/10.3390/cancers14030591, doi: 10.3390/cancers14030591. [COBISS.SI-ID 94899715], [JCR, SNIP, WoS do 5. 3. 2022: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, Scopus do 27. 2. 2022: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.50]financer: ARRS, Programi, P3-0067, SI, Farmakologija in farmakogenomika; financer: ARRS, Programi, P3-0427, SI, Sistemski pristopi k raziskavam človeškega genoma za personalizirano medicino kroničnih imunskih bolezni; financer: ARRS, Projekti, J3-9272, SI, Identifikacija molekularnih bioznačevalcev za napoved kliničnega poteka in zasevanja pri pacientkah s trojno negativnim rakom dojke kategorija: 1A1 (Z, A', A1/2); uvrstitev: <u>SCI</u>, Scopus, MBP; tip dela je verificiral OSICM točke: 52.42, št. avtorjev: 2</p>			