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**
		15						
20	**40**	**AV**	**LV**	**RV**			**195**	**9**

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:**
Opravljeno laboratorisjko delo je pogoj za pristop k izpitu	Completed laboratory work is a prerequisite for taking the exam

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.

Gastrointestinalna digestija in absorbcija. gastrointestinalni hormoni, termični učinek hrane. Izbrane vsebine iz metabolizma ogljikovih hidratov. 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. Metabolna homeostaza: metabolična vloga organov, homeostaza ogljikovih hidratov, homeostaza lipidov. Homeostaza beljakovin. Nepravilnosti v metabolni homeostazi. Celično signaliziranje, hormoni in rastni faktorji. Endokrini metabolizem – primeri organskih sistemov. Molekularna imunologija: molekule in kemijski procesi v imunskem sistemu, protitelesa, interferoni in citokini. Biokemija raka. Izbrane vsebine iz metabolizma vitaminov in njihovih nadomestkov.	Gastrointestinal digestion and absorption, gastrointestinal hormones, thermic effect of food. Selected topics in carbohydrate metabolism. Lipids: phospholipids and glycolipids in clinical medicine, cholesterol and bile acids, plasma lipoprotein associated disorders. Selected topics in lipid metabolism. Metabolic homeostatis: organs, carbohydrate and lipid homeostasis. Protein homeostasis. Abnormalities in homeostasis. Cell signaling, hormones and growth factors. Endocrine metabolism – organic systems. Molecular immunology: molecules and chemical processes in the immune system, antibodies, interferons and cytokines. Biochemistry of cancer. Selected topics from vitamin metabolism.

Temeljni literatura in viri / Reading materials:

- Lehninger principles of biochemistry. cop. 2017, 7th ed. /edited by.Nelson, David Lee, 1942- ; Cox, Michael M.
- Molecular biology of the cell, Alberts, Bruce. 7th ed., international student ed. New York : W. W. Northon & Company, cop. 2022. COBISS.SI-ID - 121551363

~~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
- Marks' basic medical biochemistry : a clinical approach. Lieberman, Michael, 1950- ; Peet, Alisa. 5th ed., [international ed.]. Philadelphia [etc.] : Wolters Kluwer Health, cop. 2018
- ~~Molecular interactions between microorganisms and cells, Hacker, J. and Heesemann, J. (Ed.)2002, ISBN: 0-471-17846-2~~
- Tekoča znanstvena periodika

Cilji in kompetence:	**Objectives and competences:**
Spoznati poglobljene vsebine iz strukture in funkcije biomolekul. Povezati strukturo in funkcijo biomolekul v biokemičnih procesih človeškega telesa ter povezati napake v strukturi in funkciji s pojavom bolezenskih stanj. Spoznati moderne metode eksperimentalne biokemije in njihovo uporabo.	To get familiar in depth with interactions between structure and function of biomolecules. 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. To get familiar with modern principles of experimental biochemistry and its applications.
Predvideni študijski rezultati: Poglobljeno razumevanje biokemijskih procesov in delovanja biomolekul. Spoznavanje sodobnih biokemijskih raziskovalnih pristopov ter razvijanje znanstveno-raziskovalnega razmišljanja.	**Intended learning outcomes:** In-depth understanding of biochemical processes and the function of biomolecules. Familiarization with modern biochemical research approaches and development of scientific research thinking.

Znanje in razumevanje: Poglobljeno temeljno teoretično in praktično znanje na področju moderne eksperimentalne biokemije.	**Knowledge and understanding:** In-depth knowledge of fundamental theoretical and practical principles of modern experimental biochemistry.
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:	**Learning and teaching methods:**
Predavanja Seminarji Vaje	Lectures Seminars Tutorial

Načini ocenjevanja:	**Delež (v %) / Share (in %)**	**Assessment methods:**
1.1. Pisni izpit	50 %	Written exam
2.7. Ustna predstavitev	30 %	Oral presentation
3.2. Seminarska naloga	20 %	Seminar paper

Reference nosilca / Course coordinator's references:

ČELEŠNIK, Helena Sabina, POTOČNIK, Uroš. Blood-based mRNA tests as emerging diagnostic tools for personalised medicine in breast cancer. Cancers, ISSN 2072-6694, 2023, vol. 15, issue 4, [article no.] 1087, str. [1]-23. https://www.mdpi.com/2072-6694/15/4/1087, https://doi.org/10.3390/cancers15041087, doi: 10.3390/cancers15041087. [COBISS.SI-ID 141250307], [JCR, SNIP, WoS do 20. 9. 2023: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 1.00, Scopus do 9. 9. 2023: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 1.00]
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 biooznačevalcev za napoved kliničnega poteka in zasevanja pri pacientkah s trojno negativnim rakom dojke
[tip COBISS: 1.02 Pregledni znanstveni članek]
[uvrstitev revije v MBP (2022): SCIE, Scopus, BIOABS, BIOPREW, CAB, CINAHL, DOAJ, PUBMED]
ŠTD = 10 ; ŠTK = 52[Z/4.1.3 Pregledni znanstveni članek (SCIE ali SSCI) - 2. četrtina]

ČELEŠNIK, Helena Sabina, BÜDEFELD, Tomaž, ČIZMAREVIČ, Bogdan, ŠVAGAN, Matija, POTOČNIK, Uroš. MIR137/MIR2682 locus is associated with perineural invasiveness in head and neck cancer. Journal of oral pathology & medicine, 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

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. *Cancers*, 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 biooznačevalcev za napoved kliničnega poteka in zasevanja pri pacientkah s trojno negativnim rakom dojke kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCI, Scopus, MBP; tip dela je verificiral OSICM točke: 52.42, št. avtorjev: 2