UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**BIOKEMIJA**
Subject Title:	**BIOCHEMISTRY**

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
BIOMEDICINSKA TEHNOLOGIJA/BIOMEDICAL TECHNOLOGY 3. stopnja/3rd Degree		1	**1/2**

Univerzitetna koda predmeta / University subject code: 1003

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Lab. work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
20	40		15		195	**9**

Nosilec predmeta / Lecturer: **Prof. dr. Uroš Potočnik**

Jeziki / Languages:	**Predavanja / Lecture:**	slovenščina, angleščina / slovenian, english
	Vaje / Tutorial:	slovenščina, angleščina/ slovenian, english

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

Kandidat mora imeti pred vpisom ustrezno znanje iz naravoslovnih ved z ustreznega področja na nivoju univerzitetnega študija.

Prerequisites:

Prior to entering, the candidate for postgraduate program must have an appropriate knowledge and understanding of bioscience (biology, chemistry, physics, mathematics) on the university level.

Vsebina:

- Biomolekule.
- Metode izolacije in kvantitativnega ter kvalitatitvnega določanja strukture in funkcije beljakovin: elektroforeza, kromatografske metode, pI, spektrofotometrija, FTIR, MALDI-MS, proteomika in metabolomika, biološki modeli.
- Imunocito(histo)kemiske metode: temeljni principi in aplikacije.
- Napake v strukturi beljakovin in z njimi povezane bolezni.
- Encimi: Regulacija in klinična aplikacija: plazemski intracelularni encimi, merjenje encimske aktivnosti, serumski markerji pri poškodbah tkiva, encimi kot analitični in terapevtski reagenti.
- Heteropolisaharidi: glikoproteini in glikolipidi, proteoglikani in peptidoglikani, oligosaharidi in občutljivost gostitelja.
- Metode določanja ogljikovih hidratov.
- Lektini.
- Transdukcija.
- Gastrointestinalna digestija in absorbcija, gastrointestinalni hormoni, termični učinek hrane.
- Izbrane vsebine iz metabolizma ogljkovih hidratov.

Contents (Syllabus outline):

- Biomolecules.
- Methods of isolation and determination of proteins: electrophoresis, chromatography, pI, spectrophotometry, FTIR, MALDI-MS, proteomics and metabolomics, biological models.
- Imunocyto(histo)chemistry: principles and applications.
- Protein folding and associated diseases.
- Enzymes: Regulation and clinical applications: intracellular 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, proteglycans and peptidoglycans.
- Analytical methods in glycobiochemistry.
- Lectins.
- Transduction.
- Gastrointestinal digestion and absorption, gastrointestinal hormones, thermic effect of food.
- Selected topics in crbohydrate metabolism.
- Lipids: phospholipids and glycolipids in clinical medicine, cholesterol and bile acids, plasma lipoprotein associated disorders.

- Lipidi: fosfolipidi in glikosfingolipidi v klinični medicini, holesterol in žolčne kisline, plazemski lipoproteini in z njimi povezane napake v organizmu.
- Metabolna homeostaza: metabolična vloga organov, homeostaza ogljkovih hidratov, homeostaza lipidov.
- Homeostaza beljakovin.
- Nepravilnosti v metabolni homeostazi.
- Endokrini metabolizem- primeri organskih sistemov.
- Molekularna imunologija: molekule in kemijski procesi v imunskem sistemu, protitelesa, interferoni in citokini.
- Biokemija raka.
- Metode pridobivanja protiteles in njihova analitska vrednost.
- Cepiva.
- Biokemija hemostaze: interakcije med metabolizmom lipidov in hemostazo.
- Izbrane vsebine iz metabolizma vitaminov in njihovih nadomestkov.
- Keto-nukleozidi.

Toksini in droge, doping. Principi in aplikacije.

- Metabolic homeostatis: organs, carbohydrate and lipid homeostasis.
- Protein homeostasis.
- Abnormalities in homeostasis.
- Endocrine metabolism – organic systems.
- Molecular immunology: molecules and chemical processes in immune system, antibodies, interferons and cytokines.
- Biochemistry of cancer.
- Production of antibodies and their applications.
- Vaccines.
- Biochemistry of hemostasis: interactions between lipid metabolism and hemostasis.
- Selected topics from vitamin metabolism.
- Keto-nucleosides.

Toxins, drugs, doping. Principles and applications

Temeljni študijski viri / Textbooks:

- Modern experimental biochemistry/edited by Rodyner Boyer, 2002, ISBN: 0-8053-3111-5
- Medical Biochemistry, Bhagavan, N.V. 2002, ISBN: 0-12-095440-0
- Textbook of Biochemistry with clinical correlations, Devlin, T.M. (Ed.) 1993, ISBN: 0-471-51348-2
- The essentials of glycobiology / edited by Ajit Varki ... et al.]., 1999, ISBN 0-87969-560-9
- Reviews of Physiology Biochemistry and Pharmacology, 1994, ISBN: 3540575367 Reviews of Physiology, Biochemistry and Pharmacology/Special Issue on Signal Transduction III, 1994, ISBN: 3540575871
- Molecualr and genetic interactions involving phytochemicals, Kreft, I. and Škrabanja, V. (Ed.) 2001, ISBN: 961-6379-02-X
- Molecular interactions between microorganisms and cells, Hacker, J. and Heesemann, J. (Ed.)2002, ISBN: 0-471-17846-2
- Mad Cow Disease and Related Spongiform EncephalopathiesSeries : Current Topics in Microbiology and Immunology , Vol. 284 Harris, D.A. (Ed.)2004, ISBN: 3-540-20107-6
- Drug Discovery and Evaluation,Pharmacological Assays,Vogel, Hans G. (Ed.)2nd, completely revised, updated, and enlarged ed., 2002, ISBN: 3-540-42396-6

Cilji:

- 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.

Objectives:

- 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:

Znanje in razumevanje:
Poglobljeno temeljno teoretično in praktično znanje na področju moderne eksperimentalne biokemije.

Intended learning outcomes:

Knowledge and Understanding:
In-depth knowledge of fundamental theoretical and practical principles of modern experimental biochemistry.

Prenesljive/ključne spretnosti in drugi atributi: teoretično in praktično znanje kot osnova za specializirane predmete (predmete izbirnih vsebin) ter za doktorsko disertacijo.	Transferable/Key Skills and other attributes: 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, • tutorials, • individualno delo z mentorjem • PBL • laboratorijske vaje	• lectures • seminars • tutorials, • individual work with tutor • PBL • laboratory practical's.

Načini ocenjevanja:	**Delež (v %) / Weight (in %)**	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project): Written exam
Pisni izpit	50	Oral exam
Ustni izpit	20	Project work and accomplished laboratory practical's
Seminarska naloga in opravljene laboratorijske vaje	30	

Reference nosilca / Lecturer's references:

JEZERNIK, Gregor, POTOČNIK, Uroš. Comprehensive genetic study of fatty acids helps explain the role of noncoding inflammatory bowel disease associated SNPs and fatty acid metabolism in disease pathogenesis. Prostaglandins, leukotrienes, and essential fatty acids, ISSN 1532-2823. [Online ed.], 2018, vol. , no. , str. [1-25]. http://www.plefa.com/article/S0952-3278(17)30210-7/pdf, https://doi.org/10.1016/j.plefa.2018.02.002, doi: 10.1016/j.plefa.2018.02.002. [COBISS.SI-ID 6249791]

ČELEŠNIK, Helena Sabina, POTOČNIK, Uroš. Improved locus-specific unmethylated controls for MS-HRM analysis derived from 5-aza-2-deoxycytidine-treated DNA. Biotechniques, ISSN 0736-6205. [Print ed.], March 2019, vol. 66, no. 3, str. 1-4, doi: 10.2144/btn-2018-0161. [COBISS.SI-ID 22141718]

ČUŠ, Maruška, VLAISAVLJEVIĆ, Veljko, REPNIK, Katja, POTOČNIK, Uroš, KOVAČIČ, Borut. Could polymorphisms of some hormonal receptor genes, involved in folliculogenesis help in predicting patient response to controlled ovarian stimulation?. Journal of assisted reproduction and genetics, ISSN 1573-7330, 2018, vol. , no. , str. https://link.springer.com/article/10.1007%2Fs10815-018-1357-4, doi: 10.1007/s10815-018-1357-4. [COBISS.SI-ID 6500671]