



Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Biokemija z osnovami mikrobiologije in genetike – diferencialni izpit
Course title:	Biochemistry with fundamentals of microbiology and genetics – differential exam

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Diferencialni izpit za smer Biologija in ekologija z naravovarstvom, 2. stopnja		1	1
Differential exam for the study programme Biology and Ecology with Nature Conservation, 2nd level		1st	1st

Vrsta predmeta / Course type

Obvezni/Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
						5

Nosilec predmeta / Lecturer:

Janja Trček

Jeziki /

Languages:

Predavanja /

Lectures:

slovenski / Slovene

Vaje / Tutorial:

slovenski / Slovene

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

Ni pogojev.

Prerequisites:

No prerequisites.

Vsebina:

Zgradba makromolekul in njihov metabolizem:

- Proteini: aminokisline, biološka funkcija proteinov, encimi, encimska kinetika, koencimi, metabolizem proteinov in aminokislin
- Ogljikovi hidrati: struktura, klasifikacija, biološka funkcija, razgradnja, biosinteza
- Lipidi: struktura, klasifikacija, biološka funkcija, razgradnja, biosinteza
- Nukleinske kisline: struktura, biološka funkcija, biosinteza
- Dihalna veriga in oksidativna fosforilacija
- Fotosinteza: Calvinov cikel in fotofosforilacija

Osnove mikrobiologije:

- Klasifikacija mikroorganizmov
- Zgradba in fiziologija bakterij
- Replikacija prokariotske celice
- Izražanje in produkcija proteinov v prokariotski celici

Content (Syllabus outline):

Structure of macromolecules and their metabolism:

- Proteins: amino acids, biological function of proteins, enzymes, enzyme kinetics, coenzymes, metabolism of proteins and amino acids
- Carbohydrates: structure, biological function, classification, catabolism, biosynthesis
- Lipids: structure, classification, biological function, catabolism, biosynthesis
- Nucleic acids: structure, biological function, biosynthesis
- Electron transport chain and oxidative phosphorylation
- Photosynthesis: Calvin cycle and photophosphorylation

Basics of microbiology:

- Classification of microorganisms
- Structure, morphology and physiology of bacteria
- Replication of prokaryotic cell
- Gene expression and protein production in prokaryotic cell

Temeljni literatura in viri / Readings:

- Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA 2014. Brock Biology of Microorganisms, 14. izdaja, Benjamin Cummings, 1136 str.
- Snyder L in Peters JE 2013. Molecular Genetics of Bacteria. 4. izdaja, ASM Press, 728 str.
- Janežič S in Trček J 2013. Mikrobiologija in genetika prokariotov. Fakulteta za naravoslovje in matematiko, Univerza v Mariboru, 73 str.
- Boyer RF 2008. Temelji biokemije. Beletrina, 634 str.

Cilji in kompetence:

- Predstaviti funkcijo osnovnih skupin makromolekul v celici, njihovo zgradbo in metabolizem
- Principi oksidativne fosforilacije in fotofosforilacije
- Predstaviti razvoj in raznolikost mikroorganizmov
- Seznaniti se z zgradbo, obliko, fiziologijo, pomnoževanjem in izražanjem genov pri prokariotskih mikroorganizmov

Objectives and competences:

- To present function of fundamental groups of macromolecules in cells, their structure and metabolism
- To give the principal mechanisms of oxidative phosphorylation and photophosphorylation
- To present the evolution and diversity of microorganisms
- To give the basics on prokaryotic structure, morphology, physiology, replication and gene expression

Predvideni študijski rezultati:**Intended learning outcomes:**

Znanje in razumevanje: • Razumevanje osnovnega metabolizma in načinov sinteze ATP • Klasifikacija mikroorganizmov in njihov pomen za razvoj kompleksnejših sistemov Prenesljive/ključne spretnosti in drugi atributi: • Sposobnost načrtovanja razgradnje in analize ključnih gradbenih elementov makromolekul • Sposobnost ločevanja osnovnih skupin mikroorganizmov	Knowledge and understanding: • Knowledge on basic metabolism and ATP production in cells • Classification of microorganisms and their importance for development of more complex biological systems Transferable/Key Skills and other attributes: • Ability to plan degradation and analysis of basic structural elements of macromolecules • Capability to differentiate the basic groups of microorganisms
---	--

Metode poučevanja in učenja:

--

Learning and teaching methods:

--

Načini ocenjevanja:		Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt)			Type (examination, oral, coursework, project):
Izpit	100%		Exam

Reference nosilca / Lecturer's references:

Gorgieva S. and **Trček J.** 2019. Bacterial cellulose: production, modification and perspectives in biomedical applications. *Nanomaterials* 9(10), 1352.

Škraban J., Cleenwerck I., Vandamme P., Fanedl L., **Trček J.** 2018. Genome sequences and description of novel exopolysaccharides producing species *Komagataeibacter pomaceti* sp. nov. and reclassification of *Komagataeibacter kombuchae* (Dutta and Gachhui 2007) Yamada et al., 2013 as a later heterotypic synonym of *Komagataeibacter hansenii* (Gosselé et al. 1983) Yamada et al., 2013. *Syst. Appl. Microbiol.* 41 (6), 581-592.

Trček J., Lipoglavšek L., Avguštin G. 2016. 16S rRNA in situ hybridisation followed by flow cytometry for rapid identification of acetic acid bacteria involved in submerged industrial vinegar production. *Food Technol. Biotechnol.* 54 (1), 108-112.

Trček J., Mira N.P., Jarboe L.R. 2015. Adaptation and tolerance of bacteria against acetic acid. *Appl. Microbiol. Biotechnol.* 99, 6215-6229.

Škraban J., Kyrpides N.C., Shapiro N., Whitmann W.B., **Trček J.** 2018. Draft genome sequence of *Chryseobacterium limigenitum* SUR2^T (LMG 28734^T) isolated from dehydrated sludge. *Braz. J. Microbiol.* 49 (1), 5-6.