Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Osnove mikrobiologije**
Course title:	**Introduction to Microbiology**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Univerzitetni študijski program: Ekologija, 1. stopnja		**3.**	**5.**
Undergraduate university programme: Ecology with Nature Conservation, 1st level		**3rd**	**5th**

Vrsta predmeta / Course type	Obvezni/Compulsory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		**15**			**75**	**4**

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:	Prerequisits:
Jih ni.	No.

Vsebina:	**Content (Syllabus outline):**
V okviru predmeta bodo študenti spoznali tri osnovne skupine, ki so predmet obravnave v mikrobiologiji (virusi, bakterije, glive – deloma), značilnosti njihove zgradbe, osnove sistematike ter njihov ekološki pomen v različnih okoljih. Obnovili bodo osnove metabolnih reakcij (redoks reakcije, fermentacija, aerobna in anaerobna respiracija) ter spoznali metabolno raznolikost prokariotov - heterotrofni, avtotrofni in litotorofni metabolizem. Poudarek bo na nekaterih metabolnih posebnostih prokariotov (fiksacija dušika, redukcija sulfata, metanogeneza, razgradnja polimerov) in njihov pomen v primarni produkciji ter pri kroženju snovi v okolju. Spoznali bodo tudi interakcije bakterij s težkimi kovinami in ksenobiotiki ter možnosti za njihovo uporabo pri bioremediaciji. Nadalje bodo obravnavali povezave prokariotov z višjimi organizmi, ki so lahko pozitivne (pomen normalnih mikrobov pri človeku, živalih in rastlinah, pomen mikrobnih simbiotov) ali negativne (nalezljive bolezni ter vpliv ekoloških sprememb na njihov razvoj in širjenje). Pri praktičnem delu bodo študenti spoznali osnovne tehnike izolacije, gojenja ter identifikacije ekološko pomembnih mikroorganizmov iz različnih okolij.	Students will get familiar with the three large groups which are objectives of microbiology (viruses, bacteria, fungi – partially), their structure, basic systematic and ecological importance within different ecosystems. Basic metabolic reactions (redox reactions, fermentation, aerobic and anaerobic respiration) and the metabolic diversity of prokaryotes will be addressed (heterotrophic, autotrophic and litotrophic metabolism). Some specific types of metabolisms (nitrate fixation, sulfate reduction, methanogenesis and polymer degradation) which all have substantial role in primary production and in cycling of elements will be studied into more detail. Interactions of prokaryotes with heavy metals and xenobiotics as well as their potential use in bioremediation will be addressed. Students will learn about mechanisms and the importance of interactions of microbes with higher organisms: the role of normal microbes in humans, animals and plants (positive effects) and effect of ecological changes on emergence and dispersion of infectious diseases (negative effects). In practical work, students will learn the basic techniques of isolation, cultivation and identification of ecologically important microorganisms.

Temeljni literatura in viri / Readings:

Obvezna literatura:

- Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA 2015. Brock Biology of Microorganisms, 14. izdaja, Pearson, 1130 str.
- Tortora GJ, Funke BR, Case CL 2018. Microbiology: A Introduction, 13. Pearson, 960 str.

Dodatna literatura:

- Slonczewski JL, Foster JW. 2013. Microbiology: An Evolving Science. 3. izdaja. Norton WW & Company, 1408 str.

Cilji in kompetence:	**Objectives and competences:**
• Predstaviti osnovne skupine mikroorganizmov, njihovo biologijo ter sistematiko • Predstaviti vlogo mikroorganizmov pri naravnih procesih ter možnosti za njihovo uporabo v industriji in drugje	• Familiarity with the biology and systematic of main groups of microorganisms. • To explain the role of microorganisms in natural processes and their potential use in industry and elsewhere.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • ekološko pomembnih skupin mikroorganizmov • njihove vloge pri naravnih procesih **Prenesljive/ključne spretnosti in drugi atributi:** • seznanjanje z osnovnimi pojmi v mikrobiologiji • seznanjanje z osnovnimi mikrobiološkimi tehnikami	**Knowledge and understanding:** • of ecologically important groups of microorganisms • of their role in natural processes **Transferable/Key Skills and other attributes:** • understanding of basic terms in microbiology • development of practical laboratory skills and basic microbiological techniques

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje • Individualno delo s študenti	• Lectures • Laboratory excersises • Individual work with students

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): • Kolokvij • Pisni izpit	 50 % 50 %	Type (examination, oral, coursework, project): • Partial exam • Written

Reference nosilca / Lecturer's references:

1. 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.
2. Lee C., Franke K.B., Kamal S.M., Kim H., Lünsdorf H., Jäger J., Nimtz M., **Trček J.,** Jänsch L., Bukau B., Mogk A., Römling U. 2018. Stand-alone ClpG disaggregase confers superior heat tolerance to bacteria. Proc. Natl. Acad. Sci. USA 115 (2):E273-E282.
3. 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.
4. Simon L., Škraban J., Kyrpides N.C., Woyke T., Shapiro N., Cleenwerck I., Vandamme P., Whitman W.B., **Trček J.** 2017. *Paenibacillus aquistagni* sp. nov., isolated from an artificial lake accumulating industrial wastewater. Antonie van Leeuwenhoek 110 (9), 1189-1197.
5. **Trček J.,** Mahnič A., Rupnik M. 2016. Diversity of the microbiota involved in wine and organic apple cider submerged vinegar production as revealed by DHPLC analysis and next-generation sequencing. Int. J. Food Microbiol. 223, 57-62.