



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Izbrana poglavja iz mikrobiologije in imunologije
<b>Course title:</b>	Selected Courses in Microbiology and Immunology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biologija in ekologija z naravovarstvom 2. stopnja		1,2	Poletni/ Zimski
Biology and Ecology with Nature Conservation, 2nd cycle		1,2	Summer/ Winter

**Vrsta predmeta / Course type**

Izbirni/Elective

**Univerzitetna koda predmeta / University course code:**

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	15	15			135	6

**Nosilec predmeta / Lecturer:**

Janja Trček

**Jeziki / Predavanja / Lectures:** slovenski/Slovenian

**Languages: Vaje / Tutorial:** slovenski/Slovenian

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

Jih ni.

**Prerequisites:**

No prerequisites.

**Vsebina:**

V okviru predmeta bodo predstavljena izbrana poglavja iz mikrobiologije in imunologije:

- Ekološke niše z ekstremnimi pogoji rasti (visokimi in nizkimi temperaturami, visokimi pritiski, visokim UV-žarčenjem, nizko vsebnostjo hranilnih snovi, visoko vsebnostjo kovin) in skupinami mikroorganizmov, ki v takih razmerah uspevajo. Obravnavani bodo mehanizmi, ki mikroorganizmom v takih razmerah omogočajo preživetje.
- Vloga mikroorganizmov v različnih vodnih in talnih okoljih, v prebavilih vretenčarjev in nevretenčarjev in industrijskih okoljih. Obravnavane bodo metode za preučevanje mikrobnih aktivnosti.
- Predstavljeni bodo pred kratkim odkriti mehanizmi regulacije izražanja genov pri bakterijah in arhejah (CRISPR in sRNA).
- Obravnavane bodo interakcije med različnimi receptorskimi molekulami in ligandi, ki vodijo do imunskega odgovora.

**Content (Syllabus outline):**

The students will get familiar with selected chapters in microbiology and immunology:

- The specific ecological niches (high and low temperatures, high UV radiation and low contents of organic substances) and the groups of microorganisms living at these conditions will be presented. The mechanisms developed by microorganisms for successful growth at these conditions will be discussed.
- The role of microorganisms in soil, water vertebrate and nonvertebrate digestive tracts and industrial settings will be presented. The methods used for following their microbial activities will be discussed.
- Novel mechanisms of gene regulation in bacteria and archaea will be discussed (CRISPR and sRNA).
- Interactions between receptor-ligand triggering the immune response.

**Temeljni literatura in viri / Readings:**

Priporočena literatura:

- Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl D.. 2015. Brock Biology of Microorganisms. 14. izdaja, Pearson, 1130 str.
- Wiley J, Sherwood L, Woolverton CJ. 2016. Prescott's Microbiology. 10. izdaja, McGraw-Hill Education, 1104 str.
- Slonczewski J in Foster JW. 2017. Microbiology: An Evolving Science. 4. izdaja, Norton WW & Company, 1376 str.

**Cilji in kompetence:**

Študent bo nagradil svoje osnovno znanje iz mikrobiologije in imunologije in se v okviru seminarjev naučil kritičnega predstavljanja objavljenih znanstvenih rezultatov na teh področjih.

**Objectives and competences:**

Students will get familiar with advanced subjects in microbiology and immunology. Giving seminar presentations they will learn the critical reporting and discussing in these research areas.

**Predvideni študijski rezultati:**

Po uspešno opravljeni učni enoti naj bi bili študenti zmožni:

- razložiti prilagoditvene mehanizme mikroorganizmov za preživetje v ekstremnih okoljskih nišah;
- pojasniti vlogo mikroorganizmov v različnih naravnih in umetnih (industrijskih) okoljih;
- razumeti sistem CRISPR in sRNA za izražanje genov pri bakterijah;
- razumeti molekulske interakcije, ki vzpodbudijo imunski odgovor.

**Intended learning outcomes:**

By the end of this course students should be able to:

- explain adaptation mechanisms of microorganisms in extreme ecological niches;
- explain functions of microorganisms in different natural and man-made (industrial) environments;
- understand system CRISPR and sRNA involved in bacterial gene expression;
- understand molecular interactions triggering immunological responses.

**Metode poučevanja in učenja**

Predavanja  
Seminarji

**Learning and teaching methods:**

Lectures  
Seminars

	Delež (v %) / Weight (in %)	Assessment:
<b>Načini ocenjevanja:</b> Pisni izpit	60%	Written exam
Predstavitev projekta	40%	Project presentation

**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<sup>T</sup> (LMG 28734<sup>T</sup>) 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.