



Univerza v Mariboru

Fakulteta za naravoslovje in
matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: Izbrana poglavja iz mikrobiologije in imunologije
Course title: 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 | Biologija | 1 | 1 |
| Biology and Ecology with Nature Conservation 2. level | Biology | 1 | 1 |

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 |
|------------------------|--------------------|-----------------------|---------------------------------|---------------------------|----------------------------------|------|
| 30 | 15 | | 15 | | 90 | 5 |

Nosilec predmeta / Lecturer:

Janja Trček

**Jeziki /
Languages:**

**Predavanja /
Lectures:** slovenski/Slovenian
Vaje / Tutorial: slovenski/Slovenian

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

Jin ni.

Prerequisites:

No.

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.
- Molekularna biologija arhej v primerjavi z bakterijami.
- 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.

The molecular biology of archaea in comparison to bacteria will be presented.

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:

Madigan MT., Martinko JM., Stahl D., Clark D. 2010. Brock Biology of Microorganisms. 13. izdaja. Benjamin Cummings.

Wiley J., Sherwood L., Woolverton C. 2010. Prescott's Microbiology. 8. izdaja. McGraw-Hill Science/Engineering/Math.

Slonczewski J., Foster JW. 2010. Microbiology: An Evolving Science. 2. izdaja. Norton WW & Company.

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:

Znanje in razumevanje:
Razumevanje delovanja mikroorganizmov v ekstremnih ekoloških nišah, posebnosti molekularne biologije arhej, novi mehanizmi regulacije izražanja genov pri mikroorganizmih in molekulske interakcije, ki vzpodbudijo imunski odgovor.

Intended learning outcomes:

Knowledge and understanding:
Understanding the adaptation mechanisms of microorganisms in extreme ecological niches, the molecular biology of archaea in comparison to bacteria, novel mechanisms of gene expression and molecular interactions triggering immunological responses.

Metode poučevanja in učenja

Predavanja
Seminarji

Learning and teaching methods:

Lectures
Seminars

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Pisni izpit

Predstavitev projekta

50%, 50%

Written exam

Project presentation

Reference nosilca / Lecturer's references:

1. **Trček, J.**, Oellerich, M., Niedung, K., Ebel, F., Freund, S., and K. Trülsch. 2011. Gut proteases target *Yersinia* invasin *in vivo*. **BMC Research Notes** 4, 129.
2. **Trček, J.**, Fuchs, T.M., and K. Trülsch. 2010. Analysis of *Yersinia enterocolitica* invasin expression *in vitro* and *in vivo* using a novel *luxCDABE* reporter system. **Microbiology**, 156, 2734-2745.
3. **Trček, J.**, Toyama, H., Czuba, J., Misiewicz, A., and K. Matsushita. 2006. Correlation between acetic acid resistance and characteristics of PQQ-dependent ADH in acetic acid bacteria. **Appl. Microbiol. Biotechnol.** 70, 366-373.
4. **Trček, J.** 2005. Quick identification of acetic acid bacteria based on nucleotide sequences of the 16S-23S rDNA internal transcribed spacer region and of the PQQ-dependent alcohol dehydrogenase gene. **Syst. Appl. Microbiol.** 28, 735-745.
5. **Trček, J.**, Wilharm, G., Jacobi, C.A., and J. Heesemann. 2002. *Yersinia enterocolitica* YopQ: strain dependent cytosolic accumulation and post-translational secretion. **Microbiology**, 148, 1457-1465.