



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

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:

Jeziki / Languages:	Predavanja /	Slovenski
	Lectures:	Slovene
	Vaje / Tutorial:	Slovenski/Slovene

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

Vsebina:

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 litotrofni 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.

Content (Syllabus outline):

Students will get familiar with the three large groups, which are objectives of microbiology (viruses, bacteria, fungi – partially), their structure, and 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 metabolisms (nitrate fixation, sulfate reduction, methanogenesis, and polymer degradation), which all have a substantial role in the primary production and cycling of elements, will be studied in more detail.

Interactions of prokaryotes with heavy metals and xenobiotics and 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 the impact of ecological changes on the emergence and dispersion of infectious diseases (negative results).

In practical work, students will learn the basic isolation techniques, cultivation, and identification of ecologically important microorganisms.

Temeljni literatura in viri / Readings:

Madigan MT, Bender KS, Buckley DH, Sattley WM, Stahl DA. 2020. Brock Biology of Microorganisms, 16. izdaja, Pearson.

Wiley J, Sherwood L, Woolverton C. 2016. Prescott's Microbiology. 10. izdaja. McGraw-Hill Science/Engineering/Math.

Slonczewski J, Foster JW. 2020. Microbiology: An Evolving Science. 5. izdaja. Norton WW & Company.

Reference nosilca / Lecturer's references:

1. Jelenko K., Cepec E., Nascimento F.X., **Trček J.** 2023. Comparative genomics and phenotypic characterization of *Gluconacetobacter entanii*, a highly acetic acid-tolerant bacterium from vinegars. *Foods* 12(1), 1-15.
2. Simonič M., Slapničar Š., **Trček J.**, Bogovič Matijašič B., Mohar Lorbeg P., Vesel A., Fras Zemljič L., Peršin Fratnik Z. 2023. Probiotic *Lactobacillus paragasseri* K7 nanofiber encapsulation using nozzle-free electrospinning. *Appl. Biochem. Biotechnol.* v tisku, 12 str.
3. Cepec E. and **Trček J.** 2022. Antimicrobial resistance of *Acetobacter* and *Komagataeibacter* species originating from vinegars. *Int. J. Environ. Res. Public Health* 19(1), str. 1-10.
4. Cetecioglu Z., Atasoy M., Cenian A., Sołowski G., **Trček J.**, Ugurlu A., Sedlakova-Kadukova J. 2022. Bio-based processes for material and energy production from waste streams under acidic conditions. *Fermentation* 8(3), str. 1-18.
5. **Trček J.**, Dogša I., Accetto T., Stopar D. 2021. Acetan and acetan-like polysaccharides: genetics, biosynthesis, structure, and viscoelasticity. *Polymers* 13(5), 1-16.