



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Mikrobna ekologija
Course title:	Microbial Ecology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Univerzitetni študijski program: Ekologija z naravovarstvom, 1. stopnja		2. ali 3.	3. ali 4. ali 5. ali 6.
Undergraduate University Programme: Ecology with Nature Preservation, 1st level		2nd or 3rd	3rd or 4th or 5th or 6th

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
15	15	15	-	-	135	6

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:

- Vlogo mikroorganizmov v različnih naravnih (vodna in talna okolja, ekstremna okolja, prebavila vretenčarjev in nevretenčarjev) in industrijskih okoljih.
- Metode za preučevanje mikrobnih aktivnosti.
- Mikrobno raznolikost in mikrobno aktivnost v različnih naravnih okoljih.
- Uporabo mikroorganizmov v biotehnologiji in mikroorganizmi kot virih industrijsko uporabnih encimov in drugih snovi.
- Z vidiki tveganja vnosa mikroorganizmov v okolje (patogenih, rekombinantnih in industrijskih sevov).
- Z interakcijami bakterij s težkimi kovinami in ksenobiotiki ter možnosti za njihovo uporabo pri bioremediaciji.
- Z mikrobiološkimi vidiki delovanja čistilnih naprav.
- Pri praktičnem delu bodo študenti izolirali mikroorganizme iz vod, tal in hrane, ter si ogledali izbrane industrijske objekte (prehrambena industrija, čistilne naprave).

Content (Syllabus outline):

Students will get familiar with:

- The role of microorganisms in different natural (water, soil, extreme environments, gut of vertebrates and nonvertebrates) and industrial environments.
- The methods for studying microbial activity will be presented.
- The microbial diversity and activities in different natural environments.
- Possible application of microorganisms in biotechnology as well as with microorganisms as sources of industrially important enzymes and other substances.
- A risk of microbial release into environment (pathogenic, recombinant and industrial strains).
- Interactions of prokaryotes with heavy metals and xenobiotics as well as their potential use in bioremediation.
- The microbiological aspects in waste treatment systems will be presented.
- In practical work, students will perform isolation of microorganisms from water, soil and food. Besides, they will visit selected industrial installations (food industry, waste treatment plants).

Temeljni literatura in viri / Readings:

- Madigan MT, Bender KS, Buckley DH, Sattley WM, Stahl DA. 2020. Brock Biology of Microorganisms, 16. izdaja, Pearson.
- Ehrlich HL, Newman DK, Kappler A. 2021. Ehrlich's Geomicrobiology, 6. izdaja, CRC Press.
- Kirchman D.L. 2012. Processes in Microbial Ecology, 2. izdaja, Oxford University Press.

Cilji in kompetence:

- Predstaviti raznolikost in vlogo mikroorganizmov v različnih okoljih.
- Predstaviti potencialno nevarnost vnosa mikroorganizmov v okolje.
- Predstaviti možno uporabo mikroorganizmov v industriji in drugih procesih.

Objectives and competences:

- Familiarity with diversity and role of microorganism in different environments.
- Presentation of a potential risk of uncontrolled release of microorganisms into environment.
- Presentation of possible applications of microorganism in industry and other processes.

Predvideni študijski rezultati:**Znanje in razumevanje:**

- Okoljsko pomembne skupine mikroorganizmov ter razumevanje njihove pozitivne in negativne vloge v različnih okoljih.
- Vloga mikroorganizmov v biotehnoloških procesih.
- Metode v mikrobni ekologiji.

Prenesljive/ključne spretnosti in drugi atributi:

- Praktično znanje metod, ki jih uporabljamo pri študiju okoljsko pomembnih mikroorganizmov.

Intended learning outcomes:**Knowledge and Understanding:**

- Ecologically important groups of microorganisms and their potential positive or negative effects within environments
- Their role in biotechnological processes
- Methods used in microbial ecology

Transferable/Key Skills and other attributes:

- Practical knowledge of methods applicable for studying ecologically important groups of microorganisms

Metode poučevanja in učenja:

- Predavanja
- Laboratorijske vaje
- Individualno delo s študenti

Learning and teaching methods:

- Lectures
- Laboratory excersises
- Individual work with students

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

- Kolokvij
- Pisni

Delež (v %) /

Weight (in %) /

Assessment:

Type (examination, oral, coursework, project):

- Partial exam
- Written

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. 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.
3. 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.
4. **Trček J.**, Dogša I., Accetto T., Stopar D. 2021. Acetan and acetan-like polysaccharides: genetics, biosynthesis, structure, and viscoelasticity. *Polymers* 13(5), 1-16.
5. Lee C., Klockgether J., Fischer S., **Trček J.**, Tümmler B., Römling U. Why? - Successful *Pseudomonas aeruginosa* clones with a focus on clone C. *FEMS microbiology reviews*. 2020, 44(6), 740-762.