



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

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|----------------------|--------------------|
| 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:

Obvezna literatura:

- Madigan M.T., Martinko J.M., Bender K.S., Buckley D.H., Stahl D.A. 2014. Brock Biology of Microorganisms, 14. izdaja, Benjamin Cummings, 1136 str.
- Kirchman D.L. 2012. Processes in Microbial Ecology, 1. izdaja, Oxford University Press, 328 str.

Dodatna literatura:

- Slonczewski J. in Foster J.W. 2013. Microbiology: An Evolving Science, 3. izdaja, Norton WW & Company, 1408 str.

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

Reference nosilca / Lecturer's references:

1. 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.
2. Korenak J., Ploder J., **Trček J.**, Hélix-Nielsen C., Petrinic I. 2018. Decolourisation and biodegradation of model azo dye solutions using a sequence batch reactor, followed by ultrafiltration. *Int. J. Environ. Sci. Technol.* 15 (3), 483-492.
3. Ber P., Van Trappen S., Vandamme P., **Trček J.** 2017. *Aeromicrobium choanae* sp. nov., an actinobacterium isolated from the choana of a garden warbler. *Int. J. Syst. Evol. Microbiol.* 67 (2), 357-361.
4. Lee C., Wigren E., **Trček J.**, Peters V., Kim J., Hasni S., Nimtz M., Lindqvist Y., Park C., Curth U., Lünsdorf H., Römling U. 2015. A protein quality control mechanism might contribute to survival of world-wide distributed *Pseudomonas aeruginosa* clone C strains. *Environ. Microbiol.* 17 (11), 4511-4526.
5. **TRČEK, Janja.** 2014. Oksalotrofne bakterije s tvorbo kalcita prispevajo k zniževanju koncentracije ogljikovega dioksida v ozračju. *Proteus*, april, 76, 8, str. 372-374.