



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Mikrobiologija
<b>Course title:</b>	Microbiology

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	1
Biology and Ecology with Nature Conservation, 2 <sup>nd</sup> cycle	/	1	1

**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	30			105	6

**Nosilec predmeta / Lecturer:**

**Jeziki / Predavanja / Lectures:**   
**Languages: Vaje / Tutorial:**

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

**Prerequisites:**

#### Vsebina:

V okviru predmeta bodo predstavljene reprezentativne skupine bakterij, arhej in gliv, iz normalnih in ekstremnih habitatov s poudarkom na posebnostih fizioloških in biokemijskih karakteristik izbranih taksonov. Predstavljena bo njihova vloga (pozitivna in negativna). Predstavljene bodo teoretične osnove taksonomije mikroorganizmov (vrsta kot osnovna taksonomska enota, taksonomski

#### Content (Syllabus outline):

Students will get familiar with the representative groups of bacteria, archaea and fungi from normal and extreme habitats. Focus will be on physiological and biochemical characteristics of selected taxons. Their role in the environment will be presented (positive and negative). Theoretical basis of microbial taxonomy will be discussed (concept of species as a basic taxonomic unit, taxonomic systems) and the

sistemi) in metode filogenetskega raziskovanja v mikrobiologiji.

Študenti se bodo seznanili s praktičnimi pristopi za identifikacijo izbranih skupin mikroorganizmov iz okolja po izolaciji in gojenju v laboratorijskih razmerah (metode za ugotavljanje fenotipskih znakov, molekulsko-biološki pristopi).

Nadalje bodo predstavljene tehnike shranjevanja mikroorganizmov v laboratorijskih razmerah in metode revitalizacije mikroorganizmov.

Seznanili se bodo tudi z računalniškimi orodji za taksonomsko obdelavo pridobljenih podatkov.

methods used for inferring the microbial phylogeny.

Students will get familiar with practical approaches for identification of certain groups of microorganisms previously isolated and cultivated under laboratory conditions (methods for identification of phenotypic characters, molecular-biological approaches).

Further on, techniques for preservation of microorganisms under the laboratory conditions will be presented as well as the methods for their revitalization.

Students will get familiar also with computer tools for performing taxonomical analysis of data obtained in the laboratory.

### Temeljni literatura in viri / Readings:

Priporočena literatura:

Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA. 2015. Brock Biology of Microorganisms. 14. izdaja, Pearson, 1130 str.

Slonczewski J in Foster JW. 2017. Microbiology: An Evolving Science. 4. izdaja, Norton WW & Company, 1376 str.

### Cilji in kompetence:

- Slušatelje seznaniti z različnimi taksonomskimi skupinami prokariotskih in evkariotskih mikroorganizmov ter z njihovo vlogo v okolju;
- Predstaviti klasične in moderne molekulsko-biološke pristope za klasifikacijo in identifikacijo mikroorganizmov, pridobljenih po izolaciji, ter za njihovo neposredno sledenje v okolju;
- Predstaviti možnosti računalniške obdelave podatkov v mikrobni taksonomiji.

### Objectives and competences:

- To present different taxonomical groups of prokaryotic and eukaryotic microorganisms and their role within an environment;
- To present classical as well as modern molecular-biological approaches for classification and identification of microorganisms after their isolation, and methods of tracing them in environments;
- To present possibilities for computer processing analysis in microbial taxonomy.

### Predvideni študijski rezultati:

Po uspešno opravljeni učni enoti naj bi bili študenti zmožni:

- razumeti in primerjati biokemijsko in fiziološko raznovrstnost mikroorganizmov iz različnih habitatov;
- pojasniti osnove bakterijske taksonomije;
- opisati metode za identifikacijo mikroorganizmov.

### Intended learning outcomes:

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

- understand and compare biochemistry and physiology of microorganisms from different habitats;
- explain basics on taxonomy of microorganisms;
- describe methods for identification of microorganisms.

**Metode poučevanja in učenja:**

Predavanja  
Seminarji  
Vaje

**Learning and teaching methods:**

Lectures  
Seminars  
Practical course

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):	Delež (v %) / Weight (in %)	Type (examination, oral, coursework, project):
Pisni izpit	45 %	Written exam
Predstavitev projekta	25 %	Project presentation
Kolokvij	30 %	Partial course

**Reference nosilca / Lecturer's references:**

- 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.
- 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.
- 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.
- 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.
- 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.