



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: Izbrana poglavja iz raznovrstnosti in identifikacije mikroorganizmov
Course title: Selected Topics in Diversity and Identification of Microorganisms

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti, 3. stopnja		1. ali 2.;	1.- 4.;
Doctoral Study Ecological Sciences, 3rd degree		1st or 2nd	1st-4th

Vrsta predmeta / Course type

Izbirni/Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
10	10	10			150	6

Nosilec predmeta / Lecturer:

Janja TRČEK

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

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

Osnovna znanja iz splošne in molekularne mikrobiologije na ravni drugostopenjskega programa.

Prerequisites:

Knowledge of basic and molecular microbiology at master level.

Vsebina:

Obravnavana bodo izbrana poglavja iz naslednjih tematskih sklopov:

- Reprezentativne skupine bakterij, arhej in gliv iz normalnih ter ekstremnih habitatov s poudarkom na posebnostih v fizioloških in biokemijskih karakteristikah izbranih taksonov. Predstavljena bo njihova vloga v okolju (pozitivne in negativne posledice).
- Teoretične osnove taksonomije mikroorganizmov (vrsta kot osnovna taksonomska enota, taksonomski sistemi) in metode filogenetskega raziskovanja v mikrobiologiji.
- Praktični pristopi za identifikacijo določenih skupin mikroorganizmov iz okolja po izolaciji in gojenju v laboratorijskih razmerah (metode za ugotavljanje fenotipskih znakov, molekulsko-biološki pristopi).
- Tehnike shranjevanja mikroorganizmov v laboratorijskih razmerah in metode revitalizacije mikroorganizmov.
- Tehnike neposrednega preiskovanja mikrobiote, brez predhodne osamitve mikroorganizmov iz kompleksnih vzorcev (DGGE, tehnike sekvenciranja nove generacije).
- Računalniška orodja za iskanje in primerjavo genomskih zaporedij.

Content (Syllabus outline):

Selected topics in the following chapters will be discussed:

- 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 methods used for inferring the microbial phylogeny.
- 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).
- Techniques for preservation of microorganisms under the laboratory conditions will be presented as well as the methods for their revitalization.
- Techniques for direct identification of microbiota, without previous isolation of microbes from the complex samples (DGGE, new generation sequencing).
- Computer tools for searching and analysis of genomic sequences.

Temeljna literatura in viri / Readings:

- Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA. 2015. Brock Biology of Microorganisms. 14. izdaja, Pearson, 1130 str.
- Bergey's manual of determinative microbiology
- Bergey's manual of systematic bacteriology
- Wiley J, Sherwood L, Woolverton CJ. 2016. Prescott's Microbiology. 10. izdaja, McGraw-Hill Education, 1104 str.

Cilji in kompetence:

- Slušatelje podrobno seznaniti z različnimi taksonomskimi skupinami prokariotskih in evkariontskih mikroorganizmov ter z njihovo vlogo v okolju.
- Podrobno predstaviti klasične in moderne molekularno-biološke pristope za klasifikacijo in identifikacijo mikroorganizmov ter za njihovo neposredno sledenje v okolju.
- Predstaviti možnosti obdelave podatkov z bioinformatičnimi orodji.

Objectives and competences:

- To present in detail different taxonomical groups of prokaryotic and eukaryotic microorganisms and their role within an environment.
- To present in detail classical as well as modern molecular-biological approaches for classification and identification, and methods of tracing them in environments.
- To present in detail possibilities for analysis of data using the bioinformatic tools.

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

- Razumevanje biokemijske in fiziološke raznovrstnosti mikroorganizmov iz različnih habitatov.
- Razumevanje taksonomske razvrstitve mikroorganizmov.

Natančno poznavanje metod za identifikacijo mikroorganizmov.

Intended learning outcomes:**Knowledge and understanding:**

- Understanding of biochemistry and physiology of microorganisms from different habitats.
- Advanced taxonomy of microorganisms.

Advanced methods for identification of microorganisms.

Metode poučevanja in učenja:

- Predavanja
- Laboratorijske vaje
- Seminarsko delo

Learning and teaching methods:

- Lectures
- Laboratory exercises
- Seminar work

Načini ocenjevanja:

- Seminarska naloga
- Pisni izpit

Delež (v %) /

Weight (in %)

Assessment:

• Seminarska naloga	40 %	• Seminar essay
• Pisni izpit	60 %	• Written exam

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.

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, 357-361.

Simon L., Škraban J., Kyrpides N.C., Woyke T., Shapiro N., Cleenwerck I., Vandamme P., Whitmann 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.