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: Biologija, 1. stopnja **Univerzitetni študijski program: Ekologija z naravovarstvom, 1. stopnja**	**/**	**2. ali 3.**	**3. ali 4. ali 5. ali 6.**
Undergraduate university programme: Biology, 1st level **Undergraduate university programme: Ecology with Nature Preservation, 1st level**	**/**	**2nd or 3rd**	**3rd or 4th or 5th or 6th**

Vrsta predmeta / Course type Izbirni/Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15	15		15		135	6

Nosilec predmeta / Lecturer: Marjanca STARČIČ ERJAVEC

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

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

Prerequisits:

Jih ni.	No.

Vsebina:	**Content (Syllabus outline):**
Predavanja: • Vloga mikroorganizmov v različnih naravnih (vodna in talna okolja, ekstremna okolja, prebavila vretenčarjev in nevretenčarjev) in industrijskih okoljih. • Metode za preučevanje mikrobnih aktivnosti. • Mikrobna raznolikost in mikrobna aktivnost v različnih naravnih okoljih, vključno z njihovimi interakcijami (znotraj in med mikrobnimi populacijami, z rastlinami, z živalmi). • Mikrobna ekologija v vidiku »Enega zdravja«. • Interakcije bakterij s kovinami in ksenobiotiki ter možnosti za njihovo uporabo pri bioremediaciji. • Vpliv namernih in nenamernih izpustov mikroorganizmov v okolje, vključno z mikrobiološkimi vidiki delovanja čistilnih naprav. **Vaje:** • Mikrobne interakcije v rastlinskih koreninskih nodulih. • Mikrobne interakcije v vzorcih prsti. • Mikrobne interakcije v vodah in čistilnih napravah. **Terenske vaje:** • Ogled čistilne naprave oz. odlagališča.	**Lectures:** • 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, including their interactions (within and with other microbial populations, with plants, with animals). • Microbial ecology in the context of »One health«. • Bacterial interactions with metals and xenobiotics as well as their potential use in bioremediation. • Intentional and nonintentional release of microorganisms into the environment, including the microbiological aspects in waste water treatment systems. **Tutorial:** • Microbial interactions in plant root nodules. • Microbial interactions in soil samples. • Microbial interactions in water and waste water treatment plants. **Field work:** • Visit to a waste water treatment plant or a landfill.

Temeljni literatura in viri / Readings:

- Madigan, M. T., Bender, K. S., Buckley, D. H., Sattley, W. M., Stahl, D. A. (2022). *Brock biology of microorganisms* (16. izdaja, str. 1124). Pearson.

Cilji in kompetence:	**Objectives and competences:**
• Poznati raznolikost in razumeti vlogo mikroorganizmov v različnih okoljih. • Razumeti potencialno nevarnost vnosa mikroorganizmov v okolje. • Razumeti vlogo mikroorganizmov v vidiku »Enega zdravja«.Poznati možno uporabo mikroorganizmov v bioremediaciji in drugih procesih.	• Know the diversity and understand the role of microorganism in different environments. • Understand the potential risk of release of microorganisms into environment. • Understand the role of microorganisms in the context of »One health«. • Know of possible applications of microorganism in bioremediation and other processes.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Študent pojasni vlogo mikroorganizmov v različnih okoljih. • Študent pojasni vlogo mikroorganizmov v bioremediacijskih procesih. • Študent pojasni princip in namen uporabe različnih metod v mikrobni ekologiji.	Knowledge and understanding: • The student explains the role of microorganisms in different environments. • The student explains the role of microorganisms in bioremediation processes. • The student explains the principle and purpose of using different method in microbial ecology.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje • Terensko delo	• Lectures • Laboratory practicals • Field work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• Pisni izpit	34	• Written exam
• Ustna predstavitev	33	• Oral presentation
• Kolokvij	33	• Midterm exam

Reference nosilca / Lecturer's references:

1. KUZNETSOVA, Marina V., NESTEROVA, Larisa Jur'evna, MIHAILOVSKAYA, Veronika S., SELIVANOVA, Polina A., KOCHERGINA, Darja A., KARIPOVA, Marina O., VALTSIFER, Igor V., AVERKINA, Anastasia S., **STARČIČ ERJAVEC, Marjanca**. Nosocomial *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*: sensitivity to chlorhexidine-based biocides and prevalence of efflux pump genes. *International journal of molecular sciences*. 2025, vol. 26, issue 1, [article no.] 355, str. 1-23.
2. VAJDIČ, Tadeja, **STARČIČ ERJAVEC, Marjanca**. Harnessing environmental yeasts - *Pichia kudriavzevii* strain ZMUM_K002 : the quest for isolates with properties for efficient biotechnological applications. *Applied microbiology*. 2025, vol. 5, no. 1, [article no.] 30, 15 str.
3. MIHAILOVSKAYA, Veronika S., **STARČIČ ERJAVEC, Marjanca**, KUZNETSOVA, Marina V. *Escherichia coli* from healthy farm animals : antimicrobial resistance, resistance genes and mobile genetic elements. *Acta veterinaria Hungarica*. 2024, vol. 72, iss. 4, str. 225-234.
4. DENEKE, Wolde, EGUALE, Tadesse, MEDHIN, Girmay, HAILE, Aklilu Feleke, ALEMAYEHU, Haile, MIHRET, Adane, PIRŠ, Mateja, STRAŠEK SMRDEL, Katja, AVBERŠEK, Jana, KUŠAR, Darja, CERAR KIŠEK, Tjaša, JANKO, Tea, STEYER, Andrej, **STARČIČ ERJAVEC, Marjanca**. Genomic characterization of extended-spectrum β-lactamase-producing and third-generation cephalosporin-resistant *Escherichia coli* isolated from stools of primary healthcare patients in Ethiopia. *Antibiotics*. 2024, vol. 13, issue 9, [article no.] 851, str. 1-19
5. ORLOVA, Ekaterina G., MASLENNIKOVA, Irina L., POSPELOVA, Julia S., **STARČIČ ERJAVEC, Marjanca**, LOGINOVA, Natalia P., TROINICH, Yana N., KUZNETSOVA, Marina V. The effect of *Escherichia coli* ŽP strain with a conjugation-based colicin E7 delivery on growth performance, hematological, biochemical, and histological parameters, gut microbiota, and nonspecific immunity of broilers. *Canadian journal of microbiology*. Nov. 2022, vol. 68, no. 11, str. 687-702.