

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	MIKROBIOLOGIJA OKOLJA
<b>Course title:</b>	ENVIRONMENTAL MICROBIOLOGY

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Vede o Zemlji in okolju, magistrski študij 2. stopnje	Biodiverziteta, ekologija in evolucija		
Earth and Environmental Sciences, Master study 2nd level	Biodiversity, ecology and evolution		

**Vrsta predmeta / Course type** Izbirni/ Elective

**Univerzitetna koda predmeta / University course code:** MIB03

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	30	10		10	70	6

**Nosilec predmeta / Lecturer:** Janez Mulec

**Jeziki / Languages:** **Predavanja / Lectures:** angleščina, angleščina / Slovenian, English  
**Vaje / Tutorial:** angleščina, angleščina / Slovenian, English

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

Končan študijski program 1. stopnje ali dodiplomski študijski program za pridobitev univerzitetne izobrazbe, sprejet pred 11. 6. 2004 s področja naravoslovja.

**Prerequisites:**

First-cycle Bologna degree or a university degree in the natural sciences.

**Vsebina:**

- Metodologija
- Biogeokemijsko kroženje
- Hidroekosfera (mikrobiologija voda in javno zdravje)
- Litoekosfera (tla, podzemlje, odlagališča)
- Atmoekosfera in aerobiologija
- Biotransformacija in biodegradacija

**Content (Syllabus outline):**

- General methodology
- Biogeochemical cycling
- Hydro-ecosphere (water microbiology and public health)
- Litho-ecosphere (soil, subsurface, landfills)
- Atmo-ecosphere and aerobiology
- Biotransformation and biodegradation

**Temeljni literatura in viri / Readings:**

- Madigan, M., Bender, K.S., Buckley, D.H., Sattley, W.M., Stahl, D. (2019). Brock Biology of Microorganisms. (15th Edition) Pearson, New York, USA, Unit I: 1. The Microbial World, 2.

Microbial Cell Structure and Function, 3. Microbial Metabolism, Unit III: Biotechnology and Synthetic Biology, Unit V: 19. Taking the Measure of Microbial Systems, 20. Microbial Ecosystems, 21. Nutrient Cycles in Nature, 22. Microbiology of the Build Environment.

- Izbrani članki iz znanstvenih revij / Selected articles from scientific journals

**Cilji in kompetence:**

Okoljska mikrobiologija obravnava vlogo, ki jo imajo mikroorganizmi pri biogeokemičnih kroženjih v vseh planetarnih okoljih. Mikroorganizmi v zraku, vodi in tleh vstopajo v številne interakcije v okolju in imajo velik vpliv na zdravje in dobro počutje ljudi. Študenti se bodo seznanili z osnovnimi načeli okoljske mikrobiologije, z biogeokemičnim kroženjem snovi, s splošnimi analitičnimi metodami, vključno z detekcijo mikrobne aktivnosti in kontrolo patogenov v okolju.

**Objectives and competences:**

Environmental microbiology addresses the role that microorganisms play in biogeochemical cycling in all planetary environments. Microorganisms in the air, water and soil interact with environment, and have a considerable impact on human health and welfare. Throughout the course, the students will become acquainted with basic principles of environmental microbiology, biogeochemical cycling, general analytical methodologies and detection of microbial activity and control of pathogens in the environment.

**Predvideni študijski rezultati:**

- Poznavanje metod in konceptov v okoljski mikrobiologiji.
- Sposobnost postavitve poskusov in interpretacije mikrobioloških rezultatov.
- Poznavanje izbranih programskih orodij in aplikacij za analizo rezultatov ter raziskovalnih trendov v okoljski mikrobiologiji.

**Intended learning outcomes:**

- Knowledge of methods and concepts in environmental microbiology.
- Ability to design experiments and interpret microbiological results.
- Knowledge of selected software and applications for analyses in environmental microbiology and modern research trends.

**Metode poučevanja in učenja:**

- Predavanja
- Laboratorijsko delo
- Terenske vaje
- Samostojna obdelava izbranega raziskovalnega vprašanja in predstavitev v obliki seminarja

**Learning and teaching methods:**

- Lectures
- Laboratory work
- Field work
- Individual elaboration of a selected research question and its presentation as a seminar

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment
• Seminarska naloga	50%	• Seminar paper
• Izpit (pisni izpit, ustno izpraševanje)	50%	• Exam (written examination, oral examination)

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

1. **Mulec, J.,** Simčič, S., Kotar, T., Kofol, R., & Stopinšek, S. (2020) Survey of *Histoplasma capsulatum* in bat guano and status of histoplasmosis in Slovenia, Central Europe. International journal of speleology, 49(1), 1-10.

2. **Mulec, J.** (2019). Phototrophs in caves. V: Moldovan, O.T., Kováč, L., Halse, S. (ur.). Cave ecology. Cham, Springer, 91-106.
3. **Mulec, J.**, Oarga-Mulec, A., Šturm, S., Tomazin, R., & Matos, T. (2017). Spacio-temporal distribution and tourist impact on airborne bacteria in a cave (Škocjan Caves, Slovenia). *Diversity*, 9(3), 1-14.
4. **Mulec, J.**, Krištufek, V., Chroňáková, A., Oarga, A., Scharfen, J., & Šestauberová, M. (2015). Microbiology of Healing Mud (Fango) from Roman Thermae Aquae lasae Archaeological Site (Varaždinske Toplice, Croatia). *Microbial ecology*, 69(2), 293-306.
5. Eleršek, T., & **Mulec, J.** (2014). The algal community at an ecocline of a cold sulphidic spring (Sovra artesian borehole, Slovenia). *Environmental earth sciences*, 71(12), 5255-5261.