

## 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
UN Biokemija, 1. stopnja	/	2.	4.
USP Biochemistry, 1 <sup>st</sup> Cycle	/	2 <sup>nd</sup>	4 <sup>th</sup>

**Vrsta predmeta / Course Type:** obvezni / Mandatory

**Univerzitetna koda predmeta / University Course Code:** BK120

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
45	/	30 LV	/	/	75	5

**Nosilec predmeta / Lecturer:** prof. dr. Nina Gunde-Cimerman /  
Dr. Nina Gunde-Cimerman, Full Professor

**Jeziki / Languages:**

<b>Predavanja / Lectures:</b>	slovenski / Slovenian
<b>Vaje / Tutorial:</b>	slovenski / Slovenian

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

Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.

**Prerequisites:**

The course has to be assigned to the student.

**Vsebina:**

Pri predmetu se bodo seznanili s kratko zgodovino mikrobiologije, s poimenovanjem in uvrščanjem mikroorganizmov, s prikazom biotske raznovrstnosti mikroorganizmov, z njihovim biotehnološkim pomenom in potencialom kot tudi s patogenimi interakcijami mikroorganizmov. Proučevanje mikroorganizmov bo potekalo s pomočjo različnih mikroskopskih, biokemijskih in molekularno-bioloških tehnik.

Predmet je organiziran v več sklopih:  
- prokariotska celica: velikost, oblika in organizacija bakterijske celice, strukture na zunanji strani celične stene, celična stena,

**Content (Syllabus outline):**

Students will be acquainted with short history of microbiology, nomenclature and classification of microorganisms, presentation of microbial biodiversity, biotechnological value and potential of microorganisms, as well as microbial pathogenic interactions. Study of microorganisms will be performed using different microscopic, biochemical and molecular techniques. The course covers several topics:  
- prokaryotic cell: size, shape and organization, cell surface structures, cell wall, specific cell inclusions, and differences between the functional anatomy of prokaryotic and eukaryotic cell,

specifične znotrajcelične strukture, razlike med funkcionalno anatomijo prokariotske in evkariotske celice,

- virusi: velikost, oblika, struktura, razmnoževanje, predstavitev izbranih skupin bakteriofagov, različnih živalskih in rastlinskih virusov,

- mikrobna rast: rastne zahteve (fizikalne, kemijske), gojišča (kemijsko definirana, kompleksna, diferencialna), metode gojenja, rast mikroorganizmov, vpliv fizikalnih in kemijskih dejavnikov na rast,

- mikrobna ekologija: vloga mikroorganizmov v naravi, ekstremofili, negojljivi mikroorganizmi, osnovne ekološke metode v mikrobiologiji,

- osnove klasifikacije mikroorganizmov in mikrobne taksonomije, ki temeljijo na morfologiji, fiziologiji in molekularnih značilnostih,

- glive kot evkariotski mikroorganizmi: opis, značilnosti vegetativne in reproduktivne rasti, saprofitna vloga.

- viruses; size, shape, structure, viral replication, viral diversity (overview of bacterial, animal and plant viruses)

- microbial growth; physicochemical growth requirements, media (chemically defined, complex, differential), methods of cultivation, growth of microorganisms, influence of physical and chemical parameters on the microbial growth, genetically stable preservation of microorganisms,

- microbial ecology: role of microorganisms in nature, extremophiles, uncultivable microorganisms, basic ecological methods in microbiology, molecular biological and biochemical methods for the detection of microorganisms in the environment,

- classification of microorganisms: phylogenetic relations, taxonomical hierarchy, criteria for the classification and identification of microorganisms based on morphology, physiology, and molecular characteristics, presentation of the main groups of archaea, bacteria, fungi and viruses,

- Fungi as eukaryotic microorganisms: general description, characteristics of their vegetative and reproductive growth, saprophytic role of fungi.

### Temeljna literatura in viri / Readings:

#### Temeljna literatura:

- Madigan M.T., Martinko J.M., Stahl D.A., Clark D.P., Brock Biology of Microorganisms. 1105 pages, Prentice Hall, 13th edition (2012), ISBN: 978-0-321-73551-5

#### Dodatna literatura:

- Tortora G.J., Funke B.R., Case C.L. Microbiology: An introduction. 944 pages, Benjamin Cummings, 8th edition (2003), ISBN: 0805376143.

- Bauman R. W., Machunis-Masuoka E., Tizar I. R., Bauman R., Bauman Microbiology,. 896 pages, Benjamin-Cummings Publishing Company; Bk&CD-Rom edition (2003), ISBN: 0805376526.

#### Spletne strani:

<http://www.personal.psu.edu/faculty/j/e/jel5/micro/>

<http://www.microbeworld.org/>

<http://www.textbookofbacteriology.net/>

<http://www.microbiological-garden.net>.

<http://www.mycolog.com/fifthtoc.html>

Dodatna /seminarska ipd. literatura bo dosegljiva preko nosilke predmeta.

### Cilji in kompetence:

Mikrobiologija je eden od naravoslovnih

### Objectives and Competences:

Students will be acquainted with the basics of

predmetov, pri katerem se študenti spoznajo z osnovami celične strukture prokariontske celice v primerjavi z evkariontsko; s parametri in kontrolo mikrobne rasti; z metabolnimi značilnostmi posameznih skupin mikroorganizmov (bakterij, arheobakterij, gliv in virusov); z osnovami mikrobne ekologije, evolucije, sistematike in taksonomije mikroorganizmov.

microbiology; prokaryotic cell structure in comparison with the eukaryotic cell; parameters and control of microbial growth; metabolic characteristics of different groups of microorganisms (bacteria, archaea, fungi, viruses). Students will also become familiar with the basics of microbial ecology, evolution, systematics and taxonomy of microorganisms.

### **Predvideni študijski rezultati:**

#### Znanje in razumevanje

Znanje in razumevanje osnovnih mikrobioloških pojmov in zakonitosti, mikrobnih struktur in procesov.

#### Uporaba

Razlikovanje različnih tipov mikrobnih celic in gojenje mikroorganizmov v laboratoriju, poznavanje metod dela v mikrobiologiji, zmožnost razlage principov oz. zakonitosti na posameznih primerih in iskanje povezav s prakso.

#### Refleksija

Študent pridobi občutek za mikrobiološke dimenzije in posebnosti živega mikrobnega sveta.

#### Prenosljive spretnosti

Teoretična in praktična podlaga potrebna za aseptično delo v mikrobiološkem laboratoriju, pri gojenju mikroorganizmov, uporaba domače in tuje literature ter drugih virov pri zbiranju in interpretiranju podatkov, poznavanje strokovnih izrazov, poročanje (ustno in pisno).

### **Intended Learning Outcomes:**

#### Knowledge and Comprehension

Knowledge and understanding of basic microbiological terms, laws, microbial structures and processes.

#### Application

The ability to differentiate between various microbial cells and the knowledge of the microbial cultivation in the laboratory, proficiency in microbiological techniques/methods, the ability to explain principles or laws in individual cases and to apply this knowledge in real-life context. Acquisition of laboratory skills.

#### Analysis

To develop an understanding of the ubiquity, importance and peculiarity of microbes in the environment.

#### Skill-transference Ability

Theoretical and practical background needed for sterile technique, culture techniques, growth assessment, microscopy. Search and critical assessment of research literature and other sources; team working; collection and interpretation of the data; correct usage of the expert terminology; written and oral communication skills.

### **Metode poučevanja in učenja:**

Predavanja in laboratorijske vaje. Študent s pridobljenim praktičnim in teoretičnim znanjem iz vaj, predavanj in ustreznih učbenikov ter po uspešno opravljenem izpitu razume osnovne mikrobiološke zakonitosti.

### **Learning and Teaching Methods:**

Lectures, group seminar work and laboratory exercises. With the acquired theoretical and practical knowledge based on the lectures, laboratory exercises and appropriate textbooks after the exam was successfully passed, the student will be able to understand the basic microbiological principles.

Delež (v %) /

**Načini ocenjevanja:****Weight (in %)****Assessment:**

Opravljenе vaje so pogoj za pristop k izpitu.  Pisni izpit. Ocene: 6-10 (pozitivno), 1-5 (negativno).		Successful performance of practical courses is the precondition for the theoretical exam.  Written exam. Marks: 6-10 (positive), 1-5 (negative).
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**Reference nosilca / Lecturer's references:**

- **GUNDE-CIMERMAN, Nina**, OREN Aharon., PLEMENITAŠ Ana (Editors): Adaptation to Life at High Salt Concentrations in Archaea, Bacteria, and Eukarya (Cellular Origin, Life in Extreme Habitats and Astrobiology) (Hardcover), 577 pages, Publisher: Springer; 1 edition (November 14, 2005) ISBN: 1402036329
- GOSTINČAR, Cene, GRUBE, Martin, DE HOOG, Sybren, ZALAR, Polona, **GUNDE-CIMERMAN, Nina**. Extremotolerance in fungi : evolution on the edge. FEMS microbiology, ecology, 2010, vol. 71, str. 2-11. [COBISS.SI-ID 2166607]
- LENASSI, Metka, GOSTINČAR, Cene, JACKMAN, Shaun, TURK, Martina, SADOWSKI, Ivan, NISLOW, Corey, **GUNDE-CIMERMAN, Nina**, PLEMENITAŠ, Ana, et al. Whole genome duplication and enrichment of metal cation transporters revealed by De Novo genome sequencing of extremely halotolerant black yeast Hortaea werneckii. PloS one, ISSN 1932-6203, Aug. 2013, vol. 8, iss. 8., [COBISS.SI-ID 30761177],