

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

**Predmet:** BIOLOŠKA KEMIJA  
**Course Title:** BIOLOGICAL CHEMISTRY

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
UŠP Kemija, 1. stopnja	/	3.	5.
USP Chemistry, 1 <sup>st</sup> Cycle	/	3 <sup>rd</sup>	5 <sup>th</sup>

**Vrsta predmeta / Course Type:**

obvezni / Mandatory

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

KE120

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
30	15	30 LV	/	/	75	5

**Nosilec predmeta / Lecturer:**

doc. dr. Gregor Gunčar / Dr. Gregor Gunčar, Assistant Professor

**Jeziki / Languages:**

**Predavanja / Lectures:** slovenski / Slovenian

**Vaje / Tutorial:** 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:**

Metode za separacijo bioloških makromolekul, metode za preučevanje bioloških makromolekul, koencimi in kofaktorji – pregled in vloga pri encimski katalizi, prenos molekul po živih organizmih, koncept sklopljenih reakcij, pretvarjanje energije v živih organizmih: dihalna veriga, oksidativna fosforilacija in fotosinteza, pregled metabolizma ogljikovih hidratov, lipidov, aminokislin, nukleotidov in drugih molekul, ki vsebujejo dušik, koncept kontrole metaboličnega pretoka, uravnavanje metabolizma in drugih procesov na ravni aktivnosti encimov, uravnavanje metabolizma in drugih procesov na ravni izražanja genov.

**Content (Syllabus outline):**

Methods for isolation and study of biological macromolecules, cofactors and their role in enzyme catalysis, transport of molecules and ions in living organisms, the concept of coupled reactions, energy transformation in living organisms: electron transport and oxidative phosphorylation, the overview of metabolism of carbohydrates, lipids, amino acids, nucleotides and other nitrogen containing compounds, regulation of metabolism and other processes on the level of the enzymatic activity, regulation of metabolism and other processes on the level of gene expression.

## Temeljna literatura in viri / Readings:

Nelson, D.L. in Cox, M.M. (Lehninger), Principles of Biochemistry, zadnja izdaja (trenutno 6. izdaja), W.H. Freeman & Co. 2013, (50% od str. 433-975).

### Cilji in kompetence:

**Cilj:** Študent bo spoznal uporabnost kemije pri študiju bioloških sistemov.

**Kompetence:** Študent bo znal uporabiti svoje znanje kemije za razlago biokemijskih procesov in bo sposoben nadgrajevati svoje znanje na tem področju.

### Objectives and Competences:

**Objectives:** Students will learn the applicability of chemistry in studying biological systems.

**Competences:** Student will know how to use the knowledge of chemistry for the interpretation of biochemical processes and will be capable of upgrading their knowledge in the field.

### Predvideni študijski rezultati:

#### Znanje in razumevanje

Študent bo dobil pregled čez procese, ki potekajo v živih organizmih in bo znal uporabiti svoje znanje kemije pri njihovi razlagi. Razumel bo pomen strukture bioloških molekul za njihovo delovanje, imel dober pregled čez metabolizem in načine uravnavanja procesov v živih organizmih.

#### Uporaba

Študent bo znal uporabljati osnovne metode za proučevanje delovanja encimov in njihovih inhibitorjev, osnovne biokemijske tehnike kot so elektroforeza, metode za izolacijo proteinov in nukleinskih kislin in nekatere računalniške programe bioinformatike. Znal bo pridobivati novo znanje, ločevati dejstva od mnenj ter povzemati in integrirati informacije in ideje na področju biokemije.

#### Refleksija

Študent se bo zavedal omejitev posameznih metod in pomanjkljivosti teorij, zavedal se bo nevarnosti pri delu z biološkim materialom in dilem na področju etike v biomedicinskih raziskavah.

#### Prenosljive spretnosti

Spretnosti uporabe domače in tuje literature in drugih virov, zbiranja in interpretiranja podatkov, uporaba IKT, uporaba različnih postopkov, poročanje (ustno in pisno), identifikacija in reševanje problemov, osnove kritičnega branja člankov na področju biokemije.

### Intended Learning Outcomes:

#### Knowledge and Comprehension

Student will gain an overview of the processes in living organisms and will be able to use his knowledge of chemistry in explaining them. He will understand the function of biological macromolecules based on their structure and will have basic overview of metabolism and its regulation in living organisms.

#### Application

Use of basic methods to study proteins, enzymes and their inhibitors, such as electrophoresis, methods for protein and DNA isolation, basic bioinformatics skills. Student will be able to gain new knowledge, discern facts from opinions and to integrate and abstract new information in the field of biochemistry.

#### Analysis

Student will be aware of the limitations of different methods and theories, will have understanding of the biohazards and will be aware of the ethical concerns in biomedical research.

#### Skill-transference Ability

Ability to find and use current scientific literature in the field, data interpretation, use of information technologies, basic scientific writing and reporting, problem identification and solving, critical reading of the scientific literature.

**Metode poučevanja in učenja:**

Predavanja, laboratorijske vaje, seminarji, projektno delo.

**Learning and Teaching Methods:**

Lectures, laboratory practicals, seminars.

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

**Assessment:**

<ul style="list-style-type: none"> <li>- seminarska naloga</li> <li>- kolokvij iz vaj</li> <li>- pisni izpit</li> </ul> <p>Opravljene vaje so pogoj za pristop k izpitu.</p>		<ul style="list-style-type: none"> <li>- seminar</li> <li>- test</li> <li>-written exam</li> </ul>
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**Reference nosilca / Lecturer's references:**

- GUNČAR, Gregor, PUNGERČIČ, Galina, KLEMENČIČ, Ivica, TURK, Vito, TURK, Dušan. Crystal structure of MHC class II-associated p41 li fragment bound to cathepsin L reveals the structural basis for differentiation between cathapsins L and S. **EMBO j.**, 1999, vol. 18, str. 793-803.

- GUNČAR, Gregor, PODOBNIK, Marjetka, PUNGERČAR, Jože, ŠTRUKELJ, Borut, TURK, Vito, TURK, Dušan. Crystal structure of porcine cathepsin H determined at 2.1 Å resolution: location of the mini-chain C-terminal carboxyl group defines cathepsin H aminopeptidase function. **Structure (London)**, 1998, vol. 6, no. 1, 51-61.

- Ching-I A. Wang\*, Gregor Gunčar\*, Jade K. Forwood, Trazel Teh, Ann-Maree Catanzariti, Gregory J. Lawrence, Fionna E Loughlin, Joel P. Mackay, Horst Joachim Schirra, Peter A. Anderson, Jeffrey G. Ellis, Peter N. Dodds, Boštjan Kobe, Crystal Structures of Flax Rust Avirulence Proteins AvrL567-A and -D Reveal Details of the Structural Basis for Flax Disease Resistance Specificity. **Plant Cell**, 2007, 19, 2898-2912. \*authors contributed equally