



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Biologija celice
<b>Course title:</b>	Biology of the Cell

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Univerzitetni študijski program Biologija, 1. stopnja		1.	1.
Undergraduate university programme Biology, 1st degree		1st	1st

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			120	6

Nosilec predmeta / Lecturer:

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

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

Jih ni.

Prerequisites:

No.

**Vsebina:**

Razumevanje biologije celice je temeljno za razumevanje drugih področij biologije. Pri predmetu se študenti seznanijo z metodami, ki se uporabljajo v moderni biologiji celice in s kemijsko sestavo celic. Študentje spoznajo celične strukture in njihove funkcije.

Povzetek vsebin:

Izvor celic, organizacija evkariotske in prokariotske celice; modelni organizmi v biologiji celice

Molekularna sestava celic

Metode proučevanja celic

Celične membrane

Transport snovi skozi membrano

Mitochondriji in mehanizem oksidativne fosforilacije

Endoplazemski retikulum

Golgijev aparat

Lizosomi in peroksisomi

Citoskelet in gibanje celice (aktinski filamenti, intermediatni filamenti in mikrotubuli)

Jedro, jedrna ovojnica in transport snovi med jedrom in citoplazmo

Kromatin in kromosomi

Celični ciklus

Mitoza in mejoza

Medcelične povezave

Apoptoza in nekroza

**Content (Syllabus outline):**

Understanding the biology of the cell is an fundamental research area to all biological sciences.

This subject provides an introduction to the methods for studying cells and the chemical structure of cells. It focuses on cell structures and their functions.

Abstract of contents:

The origin of cells, organisation of eucariotic and prokariotic cell; cells as experimental models

The molecular composition of cells

Tools of cell biology

Cell membranes

Membrane transport

Mitochondria and the mechanism of oxidative phosphorylation

The endoplasmic reticulum

The Golgi apparatus

Lysosomes and peroxisomes

The cytoskeleton and cell movement (actin filaments, intermediate filaments and microtubules)

The nucleus, nuclear envelope and traffic between the nucleus and cytoplasm

Chromatin and chromosomes

Cell cycle

Mitosis and meiosis

Cell-cell interactions

Apoptosis and necrosis

**Temeljni literatura in viri / Readings:**

Temeljni vir:

Alberts B. s sod. (2014) Molecular biology of the cell, 6th Ed. Garland Science, New York.

Dodatni viri:

Jezernik K., Veranič P., Sterle M. (2012) Celična biologija. Učbenik za študente Medicinske fakultete. DZS, Ljubljana.

Alberts B. s sod. (2009) Essential cell biology. Garland Science, New York.

Karp G. (2013) Cell and Molecular Biology. Concepts and Experiments. John Wiley & Sons, Inc., New York.

**Cilji in kompetence:**

Razumevanje metod, ki se uporabljajo v moderni biologiji celice  
Poznavanje struktur in razumevanje osnovnih procesov v celicah  
Poznavanje področij, na katerih se uporabljajo znanja biologije celice (npr. ekologija, kmetijstvo, biotehnologija in medicina).

**Objectives and competences:**

Understanding of basic methods used in modern cell biological research  
Knowledge of cell structures and understanding of basic cell processes  
In addition, students get to know the areas in which cell biology is applied (e. g. ecology, agriculture, biotechnology and medicine).

**Predvideni študijski rezultati:**

Znanje in razumevanje:

Študent bo:

- znal samostojno načrtovati laboratorijsko delo in pripraviti material za izvedbo dela;
- pridobil izkušnje in spretnosti, ki so nujno potrebne pri samostojnem laboratorijskem delu;
- razumel kemijske lastnosti makromolekul v celici in na osnovi znanja bo predvideval o strukturnih značilnostih celičnih organelov;
- sposoben uporabiti znanje o strukturnih značilnostih različnih tipov evkariotskih celic in posledično bo pravilno predvideval o njihovih funkcijah;
- na osnovi novega znanja znal ovrednotiti pomen kompleksne povezanosti celic v tkivih;
- razumel metode, ki se uporabljajo v moderni biologiji celice;
- pridobil znanja o biologiji celice, ki so nujno potrebna na drugih področjih biologije;
- spoznal, na katerih področjih se aplicirajo znanja biologije celice (npr. ekologija, kmetijstvo);
- usposobljen za delo v biološkem laboratoriju pri zahtevnejših bioloških eksperimentih.

**Intended learning outcomes:**

Knowledge and understanding:

Student will be able to:

- plan the laboratory work and the material independently;
- acquire experience and skills that are essential for individual laboratory work;
- understand chemical characteristics of different macromolecules in the cell, consequently he will be able to predict structural characteristics of the cell organelles;
- use the knowledge about structural characteristics of different types of eukaryotic cells, and consequently, he will be able to make important conclusions about their functions;
- evaluate the importance of complex connectivity of different types of cells in the tissue;
- understand methods used in modern cell biology research;
- capture knowledge of cell biology that is essential to other subjects in the field of biology;
- get knowledge of areas in which cell biology is applied (e. g. ecology, agriculture, biotechnology);
- students qualify for work in the biological laboratory at advanced biological experiments.

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**Metode poučevanja in učenja:**

Predavanja Laboratorijske vaje
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**Learning and teaching methods:**

Lectures Laboratory excersises
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Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt)	Delež (v %) / Weight (in %)	Type (examination, oral, coursework, project):
Pisni in praktični kolokviji	40	Written and practical examinations
Pisni izpit	60	Written examination

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

LIPOVŠEK DELAKORDA, Saška, LEITINGER, Gerd, JANŽEKovič, Franc, KOZEL, Peter, DARIŠ, Barbara, PERC, Matjaž, DEVETAK, Dušan, WEILAND, Nina, NOVAK, Tone. Towards understanding partial adaptation to the subterranean habitat in the European cave spider, *Meta menardi*: an ecocytological approach. *Scientific reports*. 2019, vol. 9, art. no. 9121, str. 1-15. ISSN 2045-2322. DOI: 10.1038/s41598-019-45291-z. [COBISS.SI-ID 24633608]

LIPOVŠEK DELAKORDA, Saška, KOZEL, Peter, LEITINGER, Gerd, NOVAK, Tone. Malpighian tubules in harvestmen. *Protoplasma*. 2021, vol. 258, iss. 5, str. 1145-1153, ilustr. ISSN 0033-183X. DOI: 10.1007/s00709-021-01634-0. [COBISS.SI-ID 57977603]

LIPOVŠEK DELAKORDA, Saška, NOVAK, Tone, DARIŠ, Barbara, HOFER, Ferdinand, LEITINGER, Gerd, LETOFSKY-PAPST, Ilse. Ultrastructure of spherites in the midgut diverticula and Malpighian tubules of the harvestman *Amilenus aurantiacus* during the winter diapause. *Histochemistry and cell biology*. Jan. 2022, vol.157, iss. 1, str. 107-118, ilustr. ISSN 0948-6143. DOI: 10.1007/s00418-021-02046-0. [COBISS.SI-ID 83684611]

SKELIN, Maša, DOLENŠEK, Jurij, VALLADOLID-ACEBES, Ismael, STOŽER, Andraž, LIPOVŠEK DELAKORDA, Saška. Application of transmission electron microscopy to detect changes in pancreas physiology. V: MHADHBI, Mohsen (ur.). *Electron microscopy*. London: IntechOpen, 2022. Str. 1-22, ilustr. ISBN 978-1-80355-946-9, ISBN 978-1-80355-947-6. <https://www.intechopen.com/chapters/81936>, DOI: 10.5772/intechopen.104807. [COBISS.SI-ID 118338051]

SUNKARA, Sowmya, RADULOVIĆ, Snježana, LIPOVŠEK DELAKORDA, Saška, BIRKL, Christoph, EGGENREICH, Stefan, BIRKL-TOEGLHOFER, Anna Maria, SCHINAGL, Maximilian, FUNK, Daniel,

STÖGER-POLLACH, Michael, HAYBAECK, Johannes, GÖSSLER, Walter, ROPELE, Stefan, LEITINGER, Gerd. Autolysis affects the iron cargo of ferritins in neurons and glial cells at different rates in the human brain. *Applied biochemistry and biotechnology*. 2023, 15 str., ilustr. ISSN 0273-2289. DOI: 10.1007/s10571-023-01332-w. [COBISS.SI-ID 145448963]