



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Biologija celice
Course title:	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

Obvezni/Obligatory

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:

Saška Lipovšek

Jeziki /

Languages:

Predavanja /

Lectures:

Vaje / Tutorial:

slovenski / slovene

slovenski / slovene

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

Pozitivno opravljeno laboratorijsko delo je pogoj za pristop k opravljanju izpita.

Obe naštetii obveznosti v načinih ocenjevanja morata biti opravljeni s pozitivno oceno.

Prerequisites:

Positive result of the laboratory work is a prerequisite for the written exam.

Both of the mentioned commitments must be assessed with a passing grade.

Vsebina:

Razumevanje biologije celice je temeljno za razumevanje drugih področij biologije. Pri predmetu se študenti seznaniijo 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 procariotic 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/Basic literature:**

Alberts, B. (2002). *Molecular biology of the cell* (4th ed., str. XXXIV, 1463, 86). Garland Science.

Jezernik, K., Veranič, P., & Sterle, M. (2018). *Celična biologija: učbenik za študente Medicinske fakultete* (1. izd., str. 263). DZS.

Priporočena literatura / Recommended literature:

Veranič, P., Romih, R., & Pšeničnik, M. (2010). *Praktični pouk celične biologije* (3. natis, str. 118). Tehniška založba Slovenije.

Karp, G. (2010). *Cell biology* (6th ed., International student version, str. XVIII, 765, 46). J. Wiley & sons.

Pavelka, M., & Roth, J. (2015). *Functional ultrastructure: atlas of tissue biology and pathology* (3rd revised and enlarged ed., str. XX, 402). Springer.

Lodish, H. F. (2016). *Molecular cell biology* (8th ed., str. XL, 1170). W.H. Freeman, Macmillan Learning.

Dariš, B., & Lipovšek Delakorda, S. (2021). *Biologija celice: navodila za vaje za študijski program Biologija* (1. izd., str. 70). Univerzitetna založba. doi:10.18690/978-961-286-368-5

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);

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);

- usposobljen za delo v biološkem laboratoriju pri zahtevnejših bioloških eksperimentih.	- students qualify for work in the biological laboratory at advanced biological experiments.
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Metode poučevanja in učenja:

Predavanja
Laboratorijske vaje

Learning and teaching methods:

Lectures
Laboratory excersises

Načini ocenjevanja:

Laboratorijsko delo (40 %)
Pisni izpit (60 %)

Delež (v %) /

Weight (in %)

Assessment:

Laboratory work (40 %)
Written exam (60 %)

Reference nosilca / Lecturer's references:

1. Lipovšek Delakorda, S., Vajs, T., Dariš, B., Novak, T., & Kozel, P. (2024). Autophagic activity in the midgut cells of three arachnids responds selectively to different modes of overwintering in caves. *Protoplasma*, 14. <https://doi.org/10.1007/s00709-024-02009-x>
2. Lipovšek Delakorda, S., Dolenšek, J., Dariš, B., Valladolid-Acebes, I., Vajs, T., Leitinger, G., Stožer, A., & Skelin, M. (2024). Western diet-induced ultrastructural changes in mouse pancreatic acinar cells. *Frontiers in cell and developmental biology*, 12(1380564), 17. <https://www.frontiersin.org/articles/10.3389/fcell.2024.1380564/full>
3. Kozel, P., Novak, T., Janžekovič, F., & Lipovšek Delakorda, S. (2023). Starvation hardiness as preadaptation for life in subterranean habitats. *Scientific reports*, 13(9643), 18. <https://dk.um.si/IzpisGradiva.php?id=86400>
4. Lipovšek Delakorda, S., Novak, T., Dariš, B., Hofer, F., Leitinger, G., & Letofsky-Papst, I. (2022). Ultrastructure of spherites in the midgut diverticula and Malpighian tubules of the harvestman *Amilenus aurantiacus* during the winter diapause. *Histochemistry and cell biology*, 157(1), 107–118. doi:10.1007/s00418-021-02046-0

