



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: Izbrana poglavja iz citologije in histologije
Course title: Selected Topics in Cytology and Histology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti, 3. stopnja		1. ali 2.;	1.- 4.;
Doctoral Study Ecological Sciences, 3rd degree		1st or 2nd	1st-4th

Vrsta predmeta / Course type

Izbirni/Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
15	15				150	6

Nosilec predmeta / Lecturer:

Saška LIPOVŠEK

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

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

Poznavanje citologije in histologije na ravni univerzitetnega programa.
Pozitivno opravljena seminarska naloga je pogoj za pristop k opravljanju izpita.
Obe naštetii obveznosti v načinih ocenjevanja morata biti opravljeni s pozitivno oceno.

Prerequisites:

Knowledge of cytology and histology at Graduate level.
Positive result of the seminar paper is a prerequisite for the written exam.
Both of the mentioned commitments must be assessed with a passing grade.

Vsebina:

Content (Syllabus outline):

Pri predmetu se študenti seznanijo z izbranimi raziskovalnimi metodami citologije, histologije ter s kemijsko sestavo celic. Študenti spoznajo značilnosti rastlinske in živalske celice, celične strukture, njihove funkcije in različne vrste tkiv.

Obravnavana so izbrana poglavja iz naslednjih sklopov.

- Organizacija evkariotske in prokariotske celice
- Celice kot eksperimentalni modeli
- Molekularna sestava celic
- Metode proučevanja celic
- Celične membrane in transport snovi skozi
- Mitohondriji in mehanizem oksidativne fosforilacije
- Endoplazemski retikulum in Golgijev aparat
- Lizosomi in peroksisomi
- Citoskelet in gibanje celice (aktinski filamenti, intermediatni filamenti in mikrotubuli)
- Jedro, kromatin in kromosomi
- Celični ciklus, mitotična in mejoza
- Medcelične povezave
- Vrste tkiv in njihove funkcije

This subject provides an introduction to the selected methods for studying cells and the chemical structure of the cells.

It focuses on main characteristics of plant and animal cells, cell structures, their function and different types of tissue.

Selected topics in the following chapters are discussed.

- Organisation of eukaryotic and prokaryotic cell
- Cells as experimental models
- The molecular composition of cells
- Tools of cell biology
- Cell membranes and membrane transport
- Mitochondria and the mechanism of oxidative phosphorylation
- Endoplasmic reticulum and Golgi apparatus
- Lysosomes and peroxisomes
- The cytoskeleton and cell movement (actin filaments, intermediate filaments and microtubules)
- The nucleus, chromatin and chromosomes
- Cell cycle, mitosis and meiosis
- Cell to cell interaction
- Types of tissue and their function

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:

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:

Študenti obvladajo izbrane metode v moderni citologiji in histologiji.
Usvojijo vrhunska znanja na specifičnih področjih v citologiji in histologiji.

Objectives and competences:

Students get skills in selected methods used in modern cytology and histology.
Students acquire top-level knowledge in specific fields in cytology and histology.

Predvideni študijski rezultati:**Znanje in razumevanje:**

- Poglobljeno razumejo znanja s področja biologije celice, ki so nujno potrebna nadrogih področjih biologije.
- Podrobno spoznajo izbrana področja, kjer uporabljamo znanja biologije celice (ekologija, kmetijstvo, biotehnologija, medicina itd.).

Prenesljive/ključne spretnosti in drugi atributi:

- Študenti izpopolnijo izkušnje in laboratorijske spretnosti, ki so nujno potrebne pri samostojnem laboratorijskem delu. Razumejo najzahtevnejše znanstvene prispevke.

Intended learning outcomes:**Knowledge and understanding:**

- Students understand advanced knowledge concerning cytology and histology, which are essential for other fields of biology. They get acquainted with advanced knowledge with the areas in which cell biology is applied (ecology, agriculture, biotechnology, medicine and others).

Transferable/Key Skills and other attributes:

- Students acquire advanced experience and laboratory skills which are essential for an autonomous laboratory work. They understand most advanced scientific contributions.

Metode poučevanja in učenja:

- Predavanja, seminarsko delo, seminarska naloga

Learning and teaching methods:

- Lectures, seminar work, seminar essay

Načini ocenjevanja:

Delež (v %) /

Weight (in %)

Assessment:

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Seminarska naloga	30	Seminar paper
Pisni izpit	70	Written exam

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/lzpisGradiva.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