



Univerza v Mariboru

Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Ime predmeta:	Metode v celični fiziologiji							
Course title:	Methods in Cell Physiology							
Študijski program in stopnja Study programme and cycle	Študijska smer Study option			Letnik Year of study	Semester Semester			
Biomedicinska tehnologija/3. stopnja				2	3 ali 4			
Biomedical Technology/3rd Degree								
Vrsta predmeta (obvezni ali izbirni) / Course type (compulsory or elective)				Izbirni Elective				
Univerzitetna koda predmeta / University course code:								
Predavanja Lectures	Seminar Seminar	Vaje Tutorial			Klinične vaje Clinical training	Druge oblike študija Other forms of study	Samost. delo Individual work	ECTS
15	30	15					120	6
		AV	LV	RV				
Nosilec predmeta / Course coordinator:				Doc. dr. Jurij Dolenšek				
Jeziki /Languages:		Predavanja / Lectures:		Slovenščina/Slovene				
		Vaje / Tutorial:		Slovenščina/Slovene				
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites for enrolling in the course or for performing study obligations:				
Vsebina (kratek pregled učnega načrta):				Content (syllabus outline):				
Eden ali več od izbranih pristopov: 1. Akutna tkivna rezina trebušne slinavke 2. »Patch-clamp« tehnika 3. Amperometrija in voltometrija hormonov 4. Fotometrija kalcija v celici 5. Snemanje ionskih sprememb v celici 6. Meritve celičnega metabolizma 7. Celične kulture 8. Organotipične kulture				One of the selected approaches: 1. acute pancreas tissue slice 2. Patch-clamp technique 3. Amperometry and voltametry of hormones 4. Photometry of cytosolic calcium 5. Imaging of ion changes in the cytosol 6. Measurements of cell metabolism 7. Cell culture 8. Organotypic culture				
Temeljni literatura in viri / Reading materials:								
– JB Pawley. Handbook of biological confocal microscopy, 3rd Ed, Springer, 2010, ISBN – B Hille. Ionic channels of excitable membranes, 3rd Ed, Sinauer Associates, 2001, ISBN 978-0878933211								

Dodatni literatura in viri / Additional literature and sources:

Visokošolski učbeniki / Textbooks

- B Alberts, AD Johnson et al. Molecular biology of the cell, 6th Ed, WW Norton & Company, 2014, ISBN 978-0815344322
- B Sakmann, E Neher. Single-channel recording, 2nd Ed, Springer 1995, ISBN 978-0306448706
- D Ogden. Microelectrode techniques. 2ed, The Company of Biologist Limited, Cambridge. ISBN 978-0948601491
- **Izvirni in pregledni članki / Original and review papers**
- STOŽER, Andraž. Nernstov potencial in ohmski model membranskega potenciala = Nernst potential and the Ohmic model of membrane potential. Medicinski razgledi : [medicinski pregledni, strokovni in raziskovalni članki], ISSN 0025-8121. [Tiskana izd.], jun. 2014, letn. 53, št. 2, str. 193-202. [COBISS.SI-ID 512415288]
- STOŽER, Andraž, DOLENŠEK, Jurij, SKELIN, Maša, RUPNIK, Marjan. Cell physiology in tissue slices : studying beta cells in the islets of Langerhans = Celična fiziologija v tkivnih rezinah : preučevanje celic beta v Langerhansovih otočkih. Acta medico-biotechnica : AMB, ISSN 1855-5640. [Tiskana izd.], 2013, vol. 6, [no.] 1, str. 20-32, ilustr. http://www.actamedbio.mf.uni-mb.si/03_10id_amb_97_13_v2.pdf. [COBISS.SI-ID 512298296]
- SKELIN, Maša. Akcijski potencial = Action potential. Medicinski razgledi : [medicinski pregledni, strokovni in raziskovalni članki], ISSN 0025-8121. [Tiskana izd.], jun. 2014, letn. 53, št. 2, str. 203-217, ilustr. [COBISS.SI-ID 512415544]
- DOLENŠEK, Jurij, POHOREC, Viljem, RUPNIK, Marjan, STOŽER, Andraž. Pancreas physiology. V: SEICEAN, Andrada (ur.). Challenges in pancreatic pathology. Rijeka: InTech. cop. 2017, str. [19]-52, ilustr. <https://cdn.intechopen.com/pdfs-wm/53020.pdf>, doi: 10.5772/65895. [COBISS.SI-ID 512723000]
- SKELIN, Maša, DOLENŠEK, Jurij, RUPNIK, Marjan, STOŽER, Andraž. The triggering pathway to insulin secretion : functional similarities and differences between the human and the mouse [beta] cells and their translational relevance. Islets, ISSN 1938-2022, 2017, vol. 9, no. 6, str. 109-139, ilustr. <http://www.tandfonline.com/doi/full/10.1080/19382014.2017.1342022>, doi: 10.1080/19382014.2017.1342022. [COBISS.SI-ID 512726328]
- DOLENŠEK, Jurij, RUPNIK, Marjan, STOŽER, Andraž. Structural similarities and differences between the human and the mouse pancreas. Islets, ISSN 1938-2022, 2015, vol. 7, iss. 1, 16 str. <http://www.tandfonline.com/doi/pdf/10.1080/19382014.2015.1024405>, doi: 10.1080/19382014.2015.1024405. [COBISS.SI-ID 512507960]
- DOLENŠEK, Jurij, ŠPELIČ, Denis, SKELIN, Maša, ŽALIK, Borut, GOSAK, Marko, RUPNIK, Marjan, STOŽER, Andraž. Membrane potential and calcium dynamics in beta cells from mouse pancreas tissue slices : theory, experimentation, and analysis. Sensors, ISSN 1424-8220, 2015, vol. 15, iss. 11, str. 27393-27419, ilustr. <http://www.mdpi.com/1424-8220/15/11/27393>, doi: 10.3390/s151127393. [COBISS.SI-ID 512558136]
- DOLENŠEK, Jurij, SKELIN, Maša, RUPNIK, Marjan. Calcium dependencies of regulated exocytosis in different endocrine cells. Physiological research, ISSN 0862-8408, 2011, vol. 60, iss. Suppl. 1, str. S29-S38. http://www.biomed.cas.cz/physiolres/pdf/60%20Suppl%201/60_S29.pdf. [COBISS.SI-ID 512147512]
- Druga tekoča periodika, predvsem v revijah Molecular and cellular endocrinology, Physiological Reviews, Trends in Endocrinology and Metabolism, Endocrine Reviews, The Lancet Diabetes and Endocrinology, Diabetes, Diabetologia, Molecular Endocrinology, Endocrinology, Journal of Endocrinology, Islets, Diabetes, Obesity and Metabolism

Cilji in kompetence:	Objectives and competences:
Metodološki predmet obravnava poglobitve elektrofiziološke in optofiziološke metode v celični fiziologiji. Pri elektrofiziologiji uporabljamo različne mikroelektrode za registracijo membranskih tokov,	The methodological subject covers major electrophysiological and optophysiological methods in cell physiology. In electrophysiology we use various microelectrodes to record membrane

<p>membranske napetosti, aktivacije in inaktivacije posameznih membranskih kanalov ter meritve ekso- in endocitoze v neuroendokrinih celicah. Optofiziologija predstavlja različne načine fluorometrije ali dinamičnega slikanja v celični fiziologiji, in vključuje moderne optične pristope tako klasično fluorescentno mikroskopijo in konfokalno mikroskopijo kot tudi dvo-fotonsko mikroskopijo. Vse te metode dopolnjuje znanje o celičnih in organotipičnih kulturah.</p>		<p>currents, membrane voltages, activation and inactivation of individual ion channels, and measurements of exo- and endocytosis in neuroendocrine cells. Optophysiology includes fluorometry, dynamic imaging in cell physiology and several advanced optical approaches, like fluorescent microscopy and confocal microscopy as well as two-photon microscopy. All these methods are complemented with the knowledge in cell and organotypic cultures.</p>	
<p>Predvideni študijski rezultati:</p>		<p>Intended learning outcomes:</p>	
<p>Znanje in razumevanje: Poglobljeno znanje in razumevanje izbranega metodološkega pristopa. Vodenje laboratorijskih zapisov, analiza podatkov in znanstveno poročanje.</p>		<p>Knowledge and understanding: In-depth knowledge and understanding of the chosen experimental approach. Laboratory notes, data analysis and scientific reporting.</p>	
<p>Prenosljive/ključne spretnosti in drugi atributi: Potencialni transfer znanja v farmacevtsko industrijo. Študent pridobi ustrezno teoretično znanje in praktične veščine, uporabne v številnih drugih laboratorijih za vede o življenju. Osvoji ustrezno nomenklaturu, pregled nad literaturo in vrsto podatkov in načine prikazovanja in interpretacije rezultatov, ki vključuje tudi statistično interpretacijo rezultatov. Kritično razmišljanje, timsko delo, kreativnost, ustno in pisno komuniciranje, reševanje problemov in samokontrola.</p>		<p>Transferable/key competences and other abilities: Potential transfer of knowledge into the pharmaceutical industry. Student gets suitable theoretical knowledge and practical skills that can be used in many other life science laboratories. She learns the relevant vocabulary, receives an overview over the literature in the field, the nature of data, their visualization, and interpretation that includes statistical interpretation. Critical thinking, teamwork, creativity, oral and written communication, problem solving and self-control.</p>	
<p>Metode poučevanja in učenja:</p>		<p>Learning and teaching methods:</p>	
<p>Predavanja Seminarji Vaje (z demonstracijo in laboratorijskim nadzorom) Samostojno delo</p>		<p>Lectures Seminars Tutorial (practical with demonstrations and laborator's supervision) Individual work</p>	
<p>Načini ocenjevanja:</p>		<p>Delež (v %) / Share (in %)</p>	<p>Assessment methods:</p>
<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt)</p>			<p>Method (written or oral exam, coursework, project):</p>
<p>Seminar – pregledni članek</p>		<p>50 %</p>	<p>Seminar – review article</p>
<p>Izvedene praktične vaje - projekt</p>		<p>50 %</p>	<p>Successfully conducted practical tutorial – project work</p>
<p>Reference nosilca / Course coordinator's references:</p>			
<p>Doc. dr. Jurij Dolenshek: SERDINŠEK, Tamara, LIPOVŠEK DELAKORDA, Saška, LEITINGER, Gerd, BUT, Igor, STOŽER, Andraž, DOLENŠEK, Jurij. A novel in situ approach to studying detrusor smooth muscle cells in mice. Scientific reports, ISSN 2045-2322, 2020, vol. 10, art. no. 2685, 1-12 str., ilustr. https://www.nature.com/articles/s41598-020-59337-0#citeas, doi: 10.1038/s41598-020-59337-0. [COBISS.SI-ID 512962616], [JCR, SNIP, WoS do 11. 9. 2020: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, Scopus do 22. 9. 2020: št. citatov (TC):</p>			

0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0] financer: ARRS, Programi, P3-0396, SI, Celične in tkivne mreže kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCI, Scopus, MBP; tip dela je verificiral OSICM točke: 17.28, št. avtorjev: 6

DOLENŠEK, Jurij, POHOREC, Viljem, RUPNIK, Marjan, STOŽER, Andraž. Pancreas physiology. V: SEICEAN, Andrada (ur.). Challenges in pancreatic pathology. Rijeka: InTech. cop. 2017, str. [19]-52, ilustr. <https://cdn.intechopen.com/pdfs-wm/53020.pdf>, doi: 10.5772/65895. [COBISS.SI-ID 512723000] kategorija: 3A (Z, A', A1/2); tip dela je verificiral OSICM točke: 15, št. avtorjev: 4

STOŽER, Andraž, HOJS, Radovan, DOLENŠEK, Jurij. Beta cell functional adaptation and dysfunction in insulin resistance and the role of chronic kidney disease. Nephron journals, ISSN 2235-3186, 2019, vol. 143, no. 1, str. 33-37, ilustr. <https://www.karger.com/Article/FullText/495665>, doi: 10.1159/000495665. [COBISS.SI-ID 512876344], [JCR, SNIP, WoS do 13. 10. 2019: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.33, Scopus do 29. 9. 2019: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.33] kategorija: 1A3 (Z); uvrstitev: SCI, Scopus, MBP; tip dela je verificiral OSICM točke: 21.31, št. avtorjev: 3