Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Izbrana poglavja iz metod znanstvenoraziskovalnega dela v biologiji in ekologij**
Course title:	**Selected Topics in Methods of Scientific Research in Biology and Ecology**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti, 3. stopnja		**1**	**1**
Doctoral Study Ecological Sciences, 3rd degree			

Vrsta predmeta / Course type Obvezni/Obligatory

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
10	10				130	**5**

Nosilec predmeta / Lecturer: Dušan DEVETAK

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Poznavanje biologije in ekologije na ravni univerzitetnega programa	Knowledge of biology and ecology at graduate level

Vsebina:	**Content (Syllabus outline):**
Obravnavana so izbrana poglavja iz naslednjih sklopov. • Metode znanstveno-raziskovalnega dela v biologiji in ekologiji so vsebinsko ciljno zasnovane glede na predvideno usmeritev posamezne/ga študenta/tke in obsegajo predstavitev temeljnih raziskovalnih metod v biologiji in ekologiji, ter pregled podrobne metodologije, ki jo bo študent/ka uporabil/a pri svojem raziskovalnem delu. • Glede na vsebinsko usmeritev študenta/ke so	Selected topics in the following chapters are discussed. • Methods of scientific research in biology are based upon the prospective individual student research. They are dealing with the selected themas on general research methods, and with an overview of the special methodologies in use by a student during his/her research work. • In accordance with the selected scientific field of investigation, the consideration of methods is focused on the following areas: light and electron

selektivno obravnavane metode in tehnike z naslednjih področij: svetlobna in elektronska mikroskopija, citologija in histologija, izbrana biokemijska, biometrijska, fiziološka ter ekološka področja. • "Izbrane tehnike izolacije in identifikacije naravnih substanc" obsegajo predstavitev aparatur, pripomočkov in kemikalij za izolacijo proteinov z gelsko in ionsko izmenjevalno kromatografijo ter njihovo analizo s pomočjo fotospektrometrije in elektroforeze. • Izolacija in identifikacija lipidov in živalskih pigmentov s tankoplastno kromatografijo in s kemijsko in fluorescenčno detekcijo. • Izbrane metode v morfometriji in statistična analiza enorazsežnih spremenljivk. • Geometrijske morfometrične metode in statistična analiza dvorazsežnih spremenljivk. • ”Izbrane metode v nevrofiziologiji” ter ”Bioakustične meritve in analiza” so tematsko prirejeni pregledi metod in tehnik. • Metode vzorčenja in numerične analize biodiverzitete (favne, flore in vegetacije). • Morfološke metode na nivoju osebka obsegajo standardno zajemanje in obdelavo biometrijskih podatkov različnih vegetativnih, reproduktivnih in drugih znakov osebkov. • ”Izbrane metode v ekologiji” so pregledna obravnava standardnih metod ekološkega vzorčevanja in obdelave podatkov s poudarkom na terestričnih habitatih. • Predstavitev metod v fitocenologiji, njena tipološka obravnava na krajinskem nivoju in obdelava v GIS. • "Izbrane metode iz biotehnologije rastlin" se osredotoča na tehniko rastlinskih tkivnih kultur in njeno uporabo v biotehnologiji.	microscopy, cytology and histology, and selected domains of biochemistry, biometry, phisiology and ecology. • The chapter "Selected techniques for isolation and identification of natural substances" includes the presentation of the equipment and chemicals used in protein gel plate and colon chromatography, and the protein analysis using photospectrometry and electrophoresis. • The use of thin layer cromatography with a chemical and fluorescent detection is discussed in the context with the isolation and dentification of lipids and animal pigments. • Selected methods in morphometry, and statistical analysis of one-dimensional parameters. • Geometrical morphometrical methods, and statistical analysis of two-dimensional parameters. • "Selected methods in neurophysiology", and "Bioacoustic recordnigs and analysis" represent an overview of the topic methods and techniques. • Methods of sampling and numerical ananlysis of biota (fauna, flora and vegetation) are discussed in the chapter of "Biodiversity". • Morphological methods on the individual level comprehend standard capture and treatment of biometrical data concerning diferent vegetative, reproductive and other traits of the specimens. • "Selected methods in ecology" is an overview of standard methods of ecological sampling and data treatment, with an emphasis on terrestrial habitats. • The presentation of methods in phytocoenology, its topological tretise on the landscape-level, and the elaboration in GIS. • "Selected plant biotechnological techniques" are focuses on plant tissue culture techniques and its use in biotechnology.

Temeljni literatura in viri / Readings:

- Alberts, B., A. Johnson, J. Lewis, M. Raff, K.Roberts, P. Walter, 2008: Molecular biology of the cell, 5th Edition, Garland Science, New York.
- Cooper G. M., R. E. Hausman, 2013. The cell : a molecular approach. Sinauer Associates. Suderland.
- Boulton A. A., G. B. Baker , C. H. Vanderwolf, 1990: Neurophysiological Techniques, I. Basic Methods and Concepts. Humana Press, Totowa.
- Miller, T. A., 2011. Insect Neurophysiological Techniques. Springer. New York.
- Cutler, P., 2003: Protein purification protocols. Humana Press, New York.
- Glauert, A. M., 1988: Practical methods in electron microscopy. North-Holland Publishing Company, Amsterdam, New York, Oxford.
- Katz, M. J., 2007: From research to manuscript. A guide to scientific writting. Springer, 152 str.
- Kates, M., 1986: Techniques of lipidology. Elsevier, Amsterdam.
- Krebs, C. J., 1999: Ecological methodology. Addison Wesley, Boston.
- Legendre, R, A. Legendre, 2005: Numerical Ecology. Elsevir. Amsterdam.

- Sokal, R. R., F. J. Rohlf, 1995: Biometry: the principles and practice of statistics in biological research. W. H. Freeman and Com. San Francisco.
- Southwood, T. R. E. & P. A. Henderson, 2000: Ecological methods. Blackwell, Oxford.

Cilji in kompetence:	**Objectives and competences:**
• Podrobna seznanitev z izbranimi biološkimi in ekološkimi raziskovalnimi metodami in tehnikami • Študenti se podrobno usposobijo za samostojno delo in uporabo ustreznih metod in tehnik na izbranem raziskovalnem področju • Poglobljeno se seznanijo z metodami z znanstvenega področja, na katerem bodo opravili svojo raziskavo	• A advanced knowledge of selected biological and ecological methods and techniques • Student lern in detail to make an appropriate selection of methods and techniques required in their topic field of investigation • Students get in detail knowledge of methods within the topic field of their investigation

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Študent/ka dobi podroben pregled o znanstveno-raziskovalnih metodah in tehnikah v biologiji in ekologiji • Študent/ka se podrobno usposobi za uporabo ustreznih raziskovalnih metod in tehnik pri reševanju konkretnih znanstvenih problemov na izbranem področju Prenesljive/ključne spretnosti in drugi atributi: • Študent/ka se vrhunsko usposobi za ustrezno vzorčevanje oziroma zajemanje podatkov ter izpeljavo konkretnih raziskovalnih metod in tehnik	Knowledge and Understanding: • Student gets advanced knowledge about the research methods and techniques in biology and ecology • Student qualifies for selecting appropriate research methods and techniques, respectively, concerning concrete scientific problems within the topic field of investigation Transferable/Key Skills and other attributes: • Student qualifies at top-level to make an appropriate sampling or data capture, respectively, and for carrying out concrete investigation methods and techniques

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Seminar • Individualno eksperimentalno delo	• Lectures • Seminar • Individual experimental work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• Seminarska naloga • Izpit	50 % 50 %	• Seminar essay • Exam

Reference nosilca / Lecturer's references:

1. LIPOVŠEK DELAKORDA, Saška, DEVETAK, Dušan, ŠTRUS, Jasna, PABST, Maria Anna. A contribution to the functional morphology of the femoral chordotonal organ in the green lacewing Chrysoperla carnea (Neuroptera). *Anatomia, Histologia, Embryologia*, ISSN 0340-2096. [Print ed.], 2003, letn. 32, str. 291-296, ilustr. [COBISS.SI-ID 12776968], [JCR, SNIP, WoS do 4. 1. 2014: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 5, Scopus do 28. 12. 2013: št. citatov (TC): 4, čistih citatov (CI): 4, normirano št. čistih citatov (NC): 6]

2. LIPOVŠEK DELAKORDA, Saška, LETOFSKY-PAPST, Ilse, HOFER, Ferdinand, LEITINGER, Gerd, DEVETAK, Dušan. The evidence on the degradation processes in the midgut epithelial cells of the larval antlion Euroleon nostras (Geoffroy in Fourcroy, 1785) (Myrmeleontidae, Neuroptera). *Micron*, ISSN 0968-4328. [Print ed.], 2012, vol. 43, iss. 5, str. 651-665, ilustr., doi: 10.1016/j.micron.2011.11.012. [COBISS.SI-ID 18855176], [JCR, SNIP, WoS do 11. 3. 2013: št. citatov (TC): 2, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 17. 4. 2013: št. citatov (TC): 2, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1]

3. LIPOVŠEK DELAKORDA, Saška, LETOFSKY-PAPST, Ilse, HOFER, Ferdinand, PABST, Maria Anna, DEVETAK, Dušan. Application of analytical electron microscopic methods to investigate the function of spherites in the midgut of the larval antlion Euroleon nostras (Neuroptera: Myrmeleontidae). *Microscopy research and technique*, ISSN 1059-910X, 2012, vol. 75, iss. 4, str. 397-407, ilustr., doi: 10.1002/jemt.21069. [COBISS.SI-ID 18638856], [JCR, SNIP, WoS do 18. 6. 2014: št. citatov (TC): 3, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 2. 4. 2014: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2]