



Univerza v Mariboru



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Fakulteta za naravoslovje in
matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Metode znanstvenoraziskovalnega dela v biologiji
Course title:	Methods of Scientific Research in Biology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biologija in ekologija z naravovarstvom, 2. stopnja	/	1	1
Biology and Ecology with Nature Conservation, 2 nd Level	/	1	1

Vrsta predmeta / Course type Obvezni / Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
60	60		30		210	12

Nosilec predmeta / Lecturer: Dušan Devetak

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

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

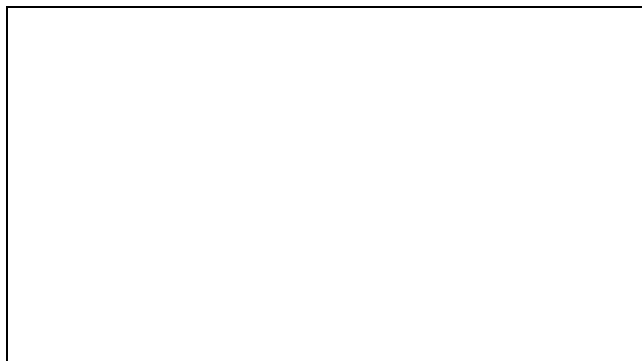
Vsebina:

- 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.
- Statistika. Osnovni pojmi teorije verjetnosti. Univariatne statistične metode. Osnove pojmi multivariatnih statističnih metod (analiza variance, analiza kovariance, regresijska analiza, faktorska analiza). Aplikacija v biologiji.
- "Izbrane tehnike izolacije in identifikacije naravnih substanc" obsegajo predstavitev aparaturne, 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 prirejene pregledi metod in tehnik.
- Metode vzorčenja in numerične analize biodiverzitete (favne, flore in vegetacije).
- Morfološke metode na nivoju osebkov 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.

Content (Syllabus outline):

- Methods of scientific research in biology are based upon the prospective individual student research. They are dealing with the selected themes on general research methods, and with an overview of the special methodologies in use by a student during his/her research work.
- Statistics. Basic concepts of probability theory. Univariate methods in statistics. Basic concepts of multivariate statistics methods (analysis of variance, analysis of covariance, regression analysis, factor analysis). Application in biology.
- 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 column chromatography, and the protein analysis using photospectrometry and electrophoresis.
- The use of thin layer chromatography with a chemical and fluorescent detection is discussed in the context with the isolation and identification 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 recordings and analysis" represent an overview of the topic methods and techniques.
- Methods of sampling and numerical analysis 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 different 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 treatise on the landscape-level, and the elaboration in GIS.
- "Selected plant biotechnological techniques" are focused on plant tissue culture techniques and its use in biotechnology.

- 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.



Temeljni literatura in viri / Readings:

- Alberts, B., A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter, 2002: Molecular biology of the cell, 4th Edition, Garland Science, New York.
- Bilodeau, M., D. Brenner 1999: Theory of Multivariate Statistics, Springer Verlag.
- Boulton A. A., G. B. Baker, C. H. Vanderwolf, 1990: Neurophysiological Techniques, I. Basic Methods and Concepts. Humana Press, Totowa.
- 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.
- 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.
- McPearson, G. 2001: Applying and Interpreting Statistics, Springer Verlag.
- 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:

- Seznanitev s temeljnimi skupinami bioloških in ekoloških raziskovalnih metod in tehnik.
- Poglobljeno se seznanijo z metodami z znanstvenega področja, na katerem bodo opravili svojo raziskavo.
- Študenti se usposobijo za samostojno delo in uporabo ustreznih metod in tehnik na izbranem raziskovalnem področju

Objectives and competences:

- An overview of the basic groups of biological and ecological methods and techniques
- Students get knowledge of methods within the topic field of their investigation
- Student learn to make an appropriate selection of methods and techniques required in their topic field of investigation

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent/ka dobi pregled nad temeljnimi skupinami znanstveno-raziskovalnih metod in tehnik v biologiji in ekologiji.

Študent/ka se usposobi za uporabo ustreznih raziskovalnih metod in tehnik pri reševanju konkretnih znanstvenih problemov na izbranem področju.

Študent/ka se usposobi za ustrezno vzorčevanje

Intended learning outcomes:

Knowledge and understanding:

Student gets knowledge about the basic groups of 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.

Student qualifies to make an appropriate sampling or data capture, respectively, and for carrying out concrete investigation methods and techniques.

oziroma zajemanje podatkov ter izpeljavo konkretnih raziskovalnih metod in tehnik.

Metode poučevanja in učenja:

Predavanja
Seminar
Individualno eksperimentalno delo

Learning and teaching methods:

Lectures
Seminar
Individual experimental work

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)
Naloga
Seminarska naloga in zagovor
Ustni izpit

Delež (v %) /

Weight (in %)

Assessment:

Type (examination, oral, coursework, project):
Coursework
Seminar essay and its defense
Oral exam

Reference nosilca / Lecturer's references:

MENCINGER VRAČKO, Bojana, DEVETAK, Dušan. Orientation of the pit-building antlion larva *Euroleon* (Neuroptera, Myrmeleontidae) to the direction of substrate vibrations caused by prey. *Zoology*. [Print ed.], 2008, vol. 111, iss. 1, str. 2-8, ilustr. [COBISS.SI-ID [15674632](#)]

DEVETAK, Dušan, LIPOVŠEK DELAKORDA, Saška, PABST, Maria Anna. Larval morphology of the antlion *Neuroleon microstenus* (McLachlan, 1898) (Neuroptera, Myrmeleontidae), with notes on larval biology. *Zootaxa (Print)*, 2010, 2428, str. 55-63, ilustr. <http://www.mapress.com/zootaxa/2010/f/zt02428p063.pdf>. [COBISS.SI-ID [17543944](#)]

DEVETAK, Dušan, LIPOVŠEK DELAKORDA, Saška, PABST, Maria Anna. Morphology and biology of the antlion *Myrmeleon yemenicus* Hölzel, 2002 (Neuroptera, Myrmeleontidae). *Zootaxa (Print)*, 2010, 2531, str. 48-56, ilustr. [COBISS.SI-ID [17865480](#)]

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* (1993). [Print ed.], 2012, vol. 43, iss. 5, str. 651-665, ilustr., doi: [10.1016/j.micron.2011.11.012](https://doi.org/10.1016/j.micron.2011.11.012). [COBISS.SI-ID [18855176](#)]

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). *Microsc. res. tech. (Print)*, 2012, vol. 75, iss. 4, str. 397-407, ilustr., doi: [10.1002/jemt.21069](https://doi.org/10.1002/jemt.21069). [COBISS.SI-ID [18638856](#)]

