Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Uvod v znanstvenoraziskovalno delo**
Course title:	**Introduction to scientific research work**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti, 3. stopnja		**1.; 1st**	**1.; 1st**
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
15	**45**				**120**	**6**

Nosilec predmeta / Lecturer:	prof. dr. Andrej ŠORGO

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

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

Vsebina:	**Content (Syllabus outline):**
Doktorski študent in mentor, naloge študenta in mentorja, postopek in zahteve za pridobitev doktorata znanosti na UM. Osnovni principi in načela znanstvenega dela, raziskovanja in komunikaciranja. Faze raziskovalnega dela:	PhD student and mentor, duties of students and mentors, procedure and requirements for obtaining PhD at UM. Fundamental principles of scientific work, research and communication. Phases of research work: 1: definition and articulation of research aims, goals, and objectives. - formulation of research questions; - formulation of hypotheses;

1: opredelitev in oblikovanje raziskovalnega problema, namena in ciljev raziskave; - oblikovanje raziskovalnih vprašanj; - oblikovanje hipotez; - definiranje informacij / podatkov potrebnih za raziskavo. 2: lokacija in dostop do informacij / podatkov; - vrste podatkov / informacij; - iskalne strategije v akademskih podatkovnih bazah; - iskalne strategije v digitalnih okoljih; - načela zbiranja podatkov (vzorčenja; opazovanja; meritve; eksperimenti; zgodovinska metoda; terensko delo). 3: ocena informacij / podatkov - kvalitativni in kvantitativni kriteriji za ocenjevanje podatkov / informacij; - kompilacija podatkov in identifikacija spremenljivk; - znanstveni pregled. 4: organizacija informacij / podatkov - načela opisne statistike odvisnih in neodvisnih spremenljivk; - predstavitev podatkov / informacij: slike, grafi, preglednice, tekst 5: uporaba informacij / podatkov - načela interpretacije podatkov / informacij; - uporaba linearnih in posplošenih linearnih modelov; - univariatne in multivariatne statistike; - klasifikacije in ordinacije; - znanstvena razprava; - oblikovanje sklepov; 6: komunikacija in etična uporaba informacij; - etika raziskovalnega dela; - etika objave (plagiat; avtorstvo) - oblike profesionalne predstavitve; - znanstveno pisanje - pravila. - ustne predstavitve. Temeljne in specifične znanstveno raziskovalne metode in programi v biologiji in ekologiji:	- definition and articulation of information/data need. 2: location and access of information/data; - types of data/information; - search strategies in academic databases; - search strategies in digital environments; - principles of data collection (sampling; observation; measurements; experiment; historical method; field-work). 3: assessment of information/data - quality and quantitative criteria for data/informaton assessment; - compilation of data and identification of variables; - scientific review. 4: organisation of information/data - principles of descriptive statistics of dependent and independent variables; - data/information presentation figures, tables, text 5: use of information/data - principles of data/information interpretation; - linear and generalized linear models; - univariate and multivariate statistics; - classifications and ordinations; - scientific discussion; - formulation of conclusions; 6: communication and ethical use of information; - ethics of research work; - ethics of publication (plagiarism; authorship) - forms of professional presentations; - scientific writing as a genre – it's rules. - oral presentations. Fundamental and specific scientific methods and software in biology and ecology: • ANOVA, ANCOVA, MANOVA, Poisson and Logistic Regression, PCA, DCA, CCA with the use of programs R, Canoco, TWINSPAN; • Combining un-spatial and spatial databases (SQL rules, creating geodatabase and shape formats) • Image analysis – knowledge and use of national, regional and global remote sensing databases (LANDSAT, IKONOS, MODIS, ESA CCI, LIDAR, ...) • Basics of spatial analysis and environmental

- ANOVA, ANCOVA, MANOVA, Poisson regresija, Logistična regresija, PCA, DCA, CCA z uporabo R, Canoco, TWINSPAN - povezava relacijskih podatkovnih zbirk z prostorskimi podatkovnimi bazami (uporaba SQL ukazov, geodatabase, shape itd.) - analiza podob - poznavanje in uporaba nacionalnih in globalnih podatkovnih baz daljinskega zaznavanja (LANDSAT, IKONOS, MODIS, ESA CCI, LIDAR, itd.) - osnove prostorske analize in prostorskega modeliranja - uporaba obstoječih prostorskih orodij (Arc, FragSTAT, TerrSet, Global Mapper, R) - teoretični principi in orodja za obdelavo nukleotidnih in proteinskih zaporedij za izračun njihovih podobnosti in filogenetskih odnosov med organizmi	modeling (ArcGIS, FragSTAT, TerrSet, Global Mapper, R,…) • Theoretical principles and tools for the analysis of nucleotide and protein sequences for calculating their similarity and phylogenetic relationships among organisms

Temeljni literatura in viri / Readings:

Concise guide to APA style: the official APA style guide for students (7th ed., str. XXI, 326). (2020). American Psychological Association.

Moretti, M. (2021). *How to plan, draft, and write a master's thesis proposal: with examples and common expressions* (str. 104). Institut A-STAT.

Pallant, J. (2020). *SPSS survival manual: a step by step guide to data analysis using IBM SPSS* (7th ed., str. XVI, 361). Open University Press; McGraw-Hill.

Ploj Virtič, M., Du Plessis, A., & Šorgo, A. (2023). In the search for the ideal mentor by applying the „Mentoring for effective teaching practice instrument". *European journal of teacher education, 46*(4), 688–706. doi:10.1080/02619768.2021.1957828

Šorgo, A., Ploj Virtič, M., & Dolenc, K. (2023). The idea that digital remote learning can happen anytime, anywhere in forced online teacher education is a myth. *Technology, knowledge and learning*, *28*(4), 1461–1484. doi:10.1007/s10758-023-09685-3

Lang, V., & Šorgo, A. (2024). Motivation to learn biology: adaptation and validation of a science motivation questionnaire with Slovene secondary school students. *International journal of instruction*, *17*(3), 137–156. https://www.e-iji.net/dosyalar/iji_2024_3_8.pdf

Cilji in kompetence:	**Objectives and competences:**
Po opravljenem predmetu bo študent sposoben: - uporabiti načela raziskovalnega dela; - uporabiti načela zbiranja, selekcije, organizacije, analize, ovrednotenja in predstavitve podatkov/informacij; - uporabiti načela etičnega dela na področju raziskav in objav; - uporabiti nekatere specifične metode in orodja raziskovanja v biologiji in ekologiji.	After completion of the course students should be able to: - apply priciples of research work; - apply principles of data/information collection, selection, organization; analysis, assesment and presentation; - apply principles of ethical work in research and publication of it;

	- use some specific research methods and tools in biology and ecology.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po opravljenem predmetu bi moral biti študent sposoben opisati in zagovarjati pomen načel in splošnih pravil: - raziskovalnega dela; - zbiranja, selekcije, organizacije, analize, vrednotenja in predstavitve podatkov / informacij; - etičnega dela na področju raziskav in objav; - raziskovalnih metod v biologiji in ekologiji. **Prenesljive/ključne spretnosti in drugi atributi:** Po opravljenem predmetu bi moral biti študent sposoben: - načrtovati, izvesti in poročati o svojem raziskovalnem delu v okviru svoje raziskovalne discipline; - razumeti načela in splošna pravila raziskovalnega dela zunaj primarnega raziskovalnega področja.	**Knowledge and understanding:** After completion of the course students should be able to describe importance and defend principles and general rules of : - research work; - data/information collection, selection, organization, analysis, assesment and presentation; - ethical work in research and publication of it. **Transferable/Key Skills and other attributes:** After completion of the course students should be: -able to plan, conduct, and report their research work in the context of the research discipline; - understand principles and general rules of research work outside their primary research field.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja, seminar	• Lectures, seminar work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Sprotne naloge	50%	Coursework
Ustni izpit	50%	Oral exam

Reference nosilca / Lecturer's references:

LANG, Vida, ŠORGO, Andrej. Views of students, parents, and teachers on smartphones and tablets in the development of 21st-century skills as a prerequisite for a sustainable future. Sustainability. 2024, vol. 16, iss. 7, [article no.] 3004, 14 str. ISSN 2071-1050. https://doi.org/10.3390/su16073004,

DOI: 10.3390/su16073004. [COBISS.SI-ID 193067779], [Odprti dostop, JCR, SNIP, WoS do 7. 8. 2024: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.50, Scopus do 15. 8. 2024: št. citatov; projekt: P2-0057-2018 Informacijski sistemi; financer: Javna agencija za znanstvenoraziskovalno in inovacijsko dejavnost Republike Slovenije (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.50]; kategorija: 1A2 (Z, A', A1/2); uvrstitev: Scopus (d), SCIE, SSCI, Scopus, MBP (CAB, DOAJ, FSTA, GEOREF, INSPEC, PUBMED); tip dela je verificiral OSICD; točke: 49.57, št. avtorjev: 2

ŠORGO, Andrej, CRNKOVIČ, Nuša, GABROVEC, Branko, CESAR, Katarina, SELAK, Špela. Influence of forced online distance education during the COVID-19 pandemic on the perceived stress of post-secondary students : cross-sectional study. Journal of medical internet research. 2022, vol. 24, iss. 3 (art. 30778), str. 1-18, ilustr. ISSN 1438-8871. https://www.jmir.org/2022/3/e30778, DOI: 10.2196/30778. [COBISS.SI-ID 97854979], [JCR, SNIP, WoS do 18. 5. 2023: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.20, Scopus do 26. 7. 2023: št. citatov (TC): 3, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.40], kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCIE, Scopus, MBP (CINAHL, LISA, MEDLINE, PSYCINFO, PUBMED); tip dela je verificiral OSICM; točke: 29.06, št. avtorjev: 5

LANG, Vida, ŠPERNJAK, Andreja, ŠORGO, Andrej. The relationship between the daily use of digital technologies and the reading and information literacy skills of 15-year-old students. *European journal of educational research*. 2024, vol. 13, no. 1, str. 43-54. ISSN 2165-8714. DOI: 10.12973/eu-jer.13.1.43. [COBISS.SI-ID 167396355]