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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	ZNANSTVENE METODE V OKOLJSKIH IN REGIONALNIH ŠTUDIJAH
Course title:	METHODOLOGY IN ENVIRONMENTAL AND REGIONAL STUDIES

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Okoljske in regionalne študije, doktorski študij 3. stopnje	Skupni	1	1 in 2
Environmental and Regional Studies, doctoral study 3rd level	Common	1	1 and 2

Vrsta predmeta / Course type	Obvezni /Mandatory
Univerzitetna koda predmeta / University course code:	DT001

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
30	30	20		10	180	9

Nosilec predmeta / Lecturer:	Doc. dr. Rok Ciglič, izr. prof. dr. Simona Kralj-Fišer (ostali izvajalci: dr. Drago Perko, doc. dr. Mateja Ferk, doc. dr. David Bole, Primož Pipan, dr. Peter Kumer, dr. Primož Gašperič, dr. Mimi Urbanc, dr. Manca Volk Bahun; izr. prof. dr. Urban Šilc, red. prof. dr. Andraž Čarni, doc. dr. Matjaž Gregorič, dr. Mitja Prelovšek, doc. dr. Špela Goričan)

Jeziki / Languages:	**Predavanja / Lectures:**	slovenščina, angleščina / Slovene, English
	Vaje / Tutorial:	slovenščina, angleščina / Slovene, English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisite:**
Končana druga bolonjska stopnja ustrezne smeri ali univerzitetni študij VII stopnje.	Finished second Bologna level in the appropriate field or University degree VII.

Vsebina:	**Content (Syllabus outline):**
Uvod **Temelji znanstvenega dela** Organiziranost znanosti v Sloveniji Spletni informacijski viri (Web of Science, Google Scholar, Mendeley) Zasnova znanstvene raziskave Veljavnost in zanesljivost rezultatov	**Introduction** **Essentials of the research work** Organization of science in Slovenia Web information sources (Web of Science, Google Scholar, Mendeley) Research methods Validity and reliability of the results

Pisanje znanstvenih člankov, monografij in disertacije Etika v znanosti **Pregled kvantitativnih in kvalitativnih metod** Podatki Izbrane kvantitativne metode v naravoslovju in humanistiki Izbrane kvalitativne metode v naravoslovju in humanistiki **Osnove geografskih informacijskih sistemov** Uvod v geografske informacijske sisteme Daljinsko zaznavanje Prostorska statistika in pokrajinske mere Klasifikacija, podpora odločanju Terensko delo in GIS Kartografija in spletni GIS-i **Izbrani podatkovni viri ter programska oprema** Digitalni viri podatkov Arhivski viri Programska oprema za analizo pokrajine **Zasnova in izvedba testov v naravoslovnih znanostih** Specifike eksperimentalnega načrtovanja v naravoslovnih znanostih Napake in etični pomisleki v načrtovanju eksperimentov Osnovni raziskovalni pristopi v raziskavah biodiverzitete, ekologije in evolucije; predstavitev metod iz študijskih primerov terenskih in laboratorijskih raziskav Osnovni raziskovalni pristopi v paleontologiji in sedimentologiji (specifika geoloških znanosti, analitične tehnike v paleontologiji, stratigrafiji in sedimentologiji, osnovna pravila taksonomske nomenklature, osnovna pravila stratigrafske nomenklatur) Osnovni raziskovalni pristopi v krasoslovju (primeri geološko-geomorfoloških,	Reporting research outcomes: how to write scientific papers, monographs and doctoral thesis Ethical considerations in science **Overview of quantitative and qualitative methods** Types of data Selected quantitative methods in natural and human sciences Selected qualitative methods in natural and human sciences **Basics of geographical information systems** Introduction into GIS Remote sensing Spatial statistics and landscape metrics Classification, decision support Field work and GIS Cartography and web GIS **Selected sources of data and software** Digital sources of data Archival sources Software for landscape research **Essentials of the method in natural sciences** Specifics of experimental design in natural sciences Reasoning, confounding factors and specific ethical considerations in natural sciences The basics of research methodology in biodiversity, ecology and evolution research; case studies method presentation using field work and laboratory approaches The basics of research methodology in palaeontology and sedimentary geology (Specific reasoning in Earth Science, Specific analytical techniques in paleontology, stratigraphy and sedimentology, Basic rules of taxonomic nomenclature, Basic rules of stratigraphic nomenclature) The basics of research methodology in karstology: examples of geological-

hidrogeoloških, meteoroloških, fizikalnih, laboratorijsko-kemičnih in prostorsko-geografskih metod) **Vaje** Uvod v uporabo izbranih računalniških programov Kritična diskusija o uporabi znanstvenih metod na primeru izbranih objavljenih študij GIS **Seminar** Predstavitev izbranih primerov raziskovalnih projektov **Terenske vaje** Raziskovalno delo na terenu s področja humanistike Raziskovalno delo na terenu in v laboratoriju s področja naravoslovja	geomorphological, hydrogeological, meteorological, physical, chemical (laboratory) and geographical (spatial) methods **Laboratory work** Introduction into selected computer programmes Critical discussion of the methods used in selected scientific studies GIS **Seminar** Presentation of an example of research project **Field work** Research work in the field (human science) Research work in the field and in the laboratory (natural science)

Temeljni literatura in viri / Readings:

Izbrana poglavja iz:

- Ruxton, G., & Colegrave, N. (2017). Experimental design for the life sciences. Oxford University Press. 4th Edition. Chapters I – VI.
- Vrišer, I. 2002: Uvod v geografijo. Ljubljana. Chapters 1, 3, 4
- Guides for researchers. URL: http://www.rgs.org/ (selected websites)
- Rogerson, P. 2006: Statistical methods for geography: a student guide. London. Chapters 1,2, 10
- Dillman, D. A., Smyth, J. D., Christian, L. M. 2014: Internet, Phone, Mail, and Mixed Mode Surveys: The Tailored Design Method. Hoboken. Chapters 1, 3
- Burrough, P. A., McDonnell, R. A., Lloyd, C. D. 2015: Principles of geographical information systems. Oxford. Chapters 1–6, 11
- Campbell, J. B. 1996: Introduction to remote sensing. London. Chapters 1, 11, 12
- Brewer, C. A. 2005: Designing better maps. A guide for GIS users. Redlands. Chapters 1–4

Izbrani članki iz znanstvenih revij. / Selected articles from scientific journals.

- Ager, D.V. 1993. The nature of the stratigraphic record (3rd edition). Wiley and Sons.
- Frodeman R. 1995. Geological reasoning: Geology as an interpretive and historical science. GSA Bulletin 107 (8), 960–968.
- Cochran, W., Fenner, P., Hill, M. 1979. Geowriting. A guide to writing, editing, and printing in Earth science (3rd edition). American Geological Institute. (or a later edition of this manual)
- Tucker, M. 1988. Techniques in Sedimentology. Blackwell Scientific Publications.
- The International Code of Nomenclature for algae, fungi, and plants (ICN, 2012); The International Code of Zoological Nomenclature (ICZN, 4th edition, 1999) (both in free online access).
- Salvador, A. (Ed.) 1994. International Stratigraphic Guide. A guide to stratigraphic classification, terminology, and procedure (2nd edition). International Subcommission on Stratigraphic Classification of IUGS International Commission on Stratigraphy

Cilji in kompetence:

Splošno

Cilj predmeta je predstaviti načela in metode znanstvenega dela (koraki v raziskavi) od identifikacije/zasnove znanstvenega vprašanja do pisanja znanstvenih publikacij. Predmet bo razložil principe načrtovanja in izvedbe raziskav, vključno s pogostimi napakami in etičnimi pomisleki, predstavil uporabnost kvantitativnih in kvalitativnih metod, metod geografskega informacijskega sistema, zajemanje podatkov, pisanje in vzpostavitev kritičnosti do prebranega gradiva ter pisanje prijav na projekte.
Cilj je tudi predstavitev zasnov raziskav ter njihovo kritično vrednotenje.

Specifično

Študentje se bodo na izbranih primerih podrobneje seznanili s tem, kako zasnujemo in izvedemo poskuse v znanosti.

Specifični cilji:

- poznavanje metod raziskovanja v naravoslovju, predvsem metod na področjih biodiverzitete, ekologije in evolucije, paleontologiji in sedimentologiji ter krasoslovju
- poznavanje metod raziskovanja v humanistiki, predvsem na področjih geografije
- poznavanje kvantitativnih in kvalitativnih metod,
- sposobnost snovanja raziskovalnega dela,
- sposobnost samostojnega raziskovalnega dela (s sodobnimi metodami),
- sposobnost predstavljanja znanstvenih rezultatov,
- sposobnost zbiranja različnih vrst gradiv,

Kompetence

Študent bo imel znanja za samostojno raziskovalno delo.

Objectives and competences:

General part

The objective of this course is to help students to embrace the concepts and methods in science from research problem identification to reporting research outcomes. The course will introduce students to the common scientific concepts, to experimental design, data acquisition and statistical analyses. Special emphasis will be laid on scientific ethics. The courses will overview the quantitative and qualitative methods, geographic information systems and data collection. In order to disseminate results effectively, the course will teach scientific dissemination. Our objective is to present selected research studies to students and to teach the student for critical reasoning in science.

Specific part

Students will learn how to set and realize research.

Specific goals:

- overview of research methods in natural science, in particularly in the fields of biodiversity, ecology and evolution research, palaeontology and sedimentary geology and karstology
- overview of research methods in humanities, particularly in geography
- overview of quantitative and qualitative methods,
- capability of designing research work plan,
- capability of independent research work (with modern methodology),
- capability of presenting research results,
- capability of collecting data and materials.

Competences

Student will have adequate skills for independent research work.

Predvideni študijski rezultati:

Intended learning outcomes:

● Poznavanje metod in načel raziskovanja v naravoslovju na področjih biodiverzitete, ekologije in evolucije, paleontologije in sedimentologije ter krasoslovja in humanistiki ● Sposobnost zasnove raziskovalnega dela ● Praktično poznavanje izbranih računalniških programov za raziskovalno delo ● Sposobnost dela z GIS-om ● Praktične izkušnje z raziskovalnim delom s širokega področja naravoslovnih in humanističnih znanosti ● Sposobnost pisati in kritično uporabljati znanstvene članke	● Knowledge of methods and concepts in natural (biodiversity, ecology and evolution research, palaeontology and sedimentary geology, karstology) and human sciences ● Ability to design sound research work ● Basic experiences with software used in research ● Ability to use GIS in research ● Practical experiences with research work in natural and human sciences ● Ability to write and critically review scientific literature

Metode poučevanja in učenja:	**Learning and teaching methods:**
● Predavanja ● Seminar ● Vaje ● Terenske vaje ● E-učenje	● Lectures ● Seminars ● Laboratory work (work with computers) ● Field work ● E-learning

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
● Izpit	**80**	● Exam
● Ocene iz vaj	**20**	● Laboratory work

Reference nosilca / Lecturer's references:

Rok Ciglič

1. Perko, D. (urednik), Ciglič, R. (urednik), Zorn, M. (urednik) 2020: The geography of Slovenia: small but diverse. World regional geography book series. Cham, Springer Nature. doi: 10.1007/978-3-030-14066-3
2. Ciglič, R. (glavni urednik) 2020: Acta geographica Slovenica. Ljubljana, Založba ZRC. url: https://ojs.zrc-sazu.si/ags/
3. Ciglič, R., Štrumbelj, E., Češnovar, R., Hrvatin, M., Perko, D. 2019: Evaluating existing manually constructed natural landscape classification with a machine learning-based approach. Journal of spatial information science 18. doi: 10.5311/JOSIS.2019.18.464
4. Ciglič, R., Perko, D. 2017: A method for evaluating raster data layers according to landscape classification scale. Ecological informatics 39. doi: 10.1016/j.ecoinf.2017.03.004.
5. Ciglič, R., Perko, D. 2015: Modelling as a method for evaluating natural landscape typology : the case of Slovenia. Landscape analysis and planning: geographical perspectives. Heidelberg [etc.].
6. Ciglič, R., Oštir, K. 2014: Application of MODIS products to analyze forest phenophases in relation to elevation and distance from sea. Journal of applied remote sensing 8, 1. doi: 10.1117/1.JRS.8.083669.

7. Ciglič, R. 2014: Analiza naravnih pokrajinskih tipov Slovenije z GIS-om. Geografija Slovenije 28. Ljubljana.
8. Ciglič, R., Perko, D. 2013: Europe's landscape hotspots/Pokrajinske vroče točke Evrope. Acta geographica Slovenica 53, 1. doi: 10.3986/AGS53106
9. Ciglič, R. 2012: Evaluation of digital data layers for establishing natural landscape types in Slovenia. Geopolitics, history, and international relations 4, 2.

Simona Kralj-Fišer

1. Kralj-Fišer, S., Čandek, K., Lokovšek, T., Čelik, T., Cheng, R. C., Elgar, M. A., & Kuntner, M. (2016). Mate choice and sexual size dimorphism, not personality, explain female aggression and sexual cannibalism in raft spiders. Animal Behaviour, 111, 49-55.
2. Kralj-Fišer, S., Hebets, E. A., & Kuntner, M. (2017). Different patterns of behavioral variation across and within species of spiders with differing degrees of urbanization. Behavioral Ecology and Sociobiology, 71(8), 125.
3. Kralj-Fišer, S., & Gregorič, M. (2019). Spider Welfare. In The Welfare of Invertebrate Animals (pp. 105-122). Springer, Cham.
4. Kralj-Fišer, S., Laskowski, K. L., & Garcia-Gonzalez, F. (2019). Sex differences in the genetic architecture of aggressiveness in a sexually dimorphic spider. Ecology and evolution, 9(18), 10758-10766.
5. Kralj-Fišer, S., Premate, E., Copilaş-Ciocianu, D., Volk, T., Fišer, Ž., Balázs, G., ... & Fišer, C. (2020). The interplay between habitat use, morphology and locomotion in subterranean crustaceans of the genus Niphargus. Zoology, 139, 125742.