

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	GIS IN PROSTORSKE ANALIZE V OKOLJSKIH IN REGIONALNIH ŠTUDIJAH
Course title:	GIS AND SPATIAL ANALYSIS 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		
Environmental and Regional Studies, doctoral study 3 rd level	common		

Vrsta predmeta / Course type

Izbirni / Elective

Univerzitetna koda predmeta / University course code:

DI002

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Lab. work	Druge oblike študija	Samost. delo Individ. work	ECTS
10		20		10	120	6

Nosilec predmeta / Lecturer:

doc. dr. Žiga Kokalj

Jeziki /

Languages:

Predavanja / Lectures:

Vaje / Tutorial:

slovenščina, angleščina / Slovene, English

slovenščina, angleščina / Slovene, English

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

- Predmet ne predvideva posebnih predhodnih znanj. Osnovne izkušnje z GIS in kartiranjem so zaželeni.
- Vaje so ocenjene pozitivno, če so pozitivno ocenjeni vsi posamezni zahtevani elaborati vaj.
- Pogoji za pristop k izpitu je pozitivna ocena vaj.

Prerequisite:

- This course does not assume any specific prior experience. Basic experience in mapping and GIS is beneficial.
- Exercises are rated positively if all exercise reports are rated positively.
- Positive assessment of exercises is essential for attendance at the exam.

Vsebina:

Content (Syllabus outline):

- Uvod v analizo prostorskih podatkov:
 - kako zemljevidi in prostorske analize prežemajo naš svet
 - kdo uporablja prostorske podatke, zemljevide in GIS, kako ter zakaj.
- Koordinatni sistemi, projekcije, orodja.
- Prostorski podatki:
 - načini pridobivanja (talne meritve, zajem na daljavo),
 - vrste prostorskih podatkov,
 - lastnosti.
- Upodobitve prostorskih entitet:
 - diskretni prostorski objekti in zvezni podatki,
 - karakteristike rastrskih in vektorskih podatkov.
 - več-časovne predstavitve prostorskih podatkov.
- Interpretacija zemljevidov.
- Delo z rastrskimi podatki.
- Delo z vektorskimi podatki.
- Uvod v simbole in kartografijo.
- Izdelava zemljevidov.
- Statistika, geostatistika.
- Modeliranje in prostorske analize.
- Analiza časovnih vrst.
- Vizualizacija.
- Ocena kakovosti.

- Introduction to spatial analysis:
 - how maps and spatial analysis pervade our world,
 - who uses spatial data, maps and GIS, how and what for.
- Spatial reference systems, projections, tools.
- Spatial data:
 - ways of acquisition (ground measurements, remote acquisition),
 - types of spatial data,
 - data properties.
- Representing spatial features:
 - discrete spatial objects and continuous surfaces,
 - characteristics of the two primary data formats (vector and raster)
 - multi-temporal representations of spatial data.
- Interpreting maps.
- Working with raster layers.
- Working with vector layers.
- Introduction to symbology and cartography.
- Making maps.
- Statistics, geostatistics.
- Modelling and spatial analysis.
- Time-series analysis.
- Visualisation.
- Quality assessment.

Temeljni literatura in viri / Readings:

- Burrough, Peter A., Rachael A. McDonnell and Christopher D. Lloyd. 2015. *Principles of Geographical Information Systems*. New York: Oxford University Press.
- Kalkhan, Mohammed A. 2011. *Spatial Statistics: Geospatial Information Modeling and Thematic Mapping*. Boca Raton (FL): Taylor & Francis.
- Longley, Paul A., Mike Goodchild, David J. Maguire and David W. Rhind. 2010. *Geographic Information Systems and Science*. Chichester: John Wiley & Sons.
- Muehlenhaus, Ian. *Web Cartography: Map Design for Interactive and Mobile Devices*. Boca Raton (FL): CRC Press, Taylor & Francis Group.
- 1994-. *Geografski informacijski sistemi v Sloveniji*. Ljubljana: Založba ZRC.
- Izbrani aktualni pregledni in izvorni raziskovalni članki iz revij (*International Journal of Geographical Information Science, Progress in Human Geography, Geographical Analysis, Transactions in GIS, ISPRS International Journal of Geo-Information, ISPRS Journal of Photogrammetry and Remote Sensing, Acta Geographica Slovenica*).

Cilji in kompetence:

Objectives and competences:

Cilj predmeta je pridobiti znanje o metodoloških in praktičnih izhodiščih o prostorskih analizah in prostorski statistiki z geografskimi informacijskimi sistemi. Študent pridobi naslednje predmetno specifične kompetence:

- uporabi moderne tehnologije kartiranja,
- pozna in razume ključne principe izdelave zemljevidov,
- obdela in upravlja z različnimi zapisi in oblikami prostorskih podatkov,
- uporabi GIS kot orodje v pisnem in ustnem poročilu o prostorskih analizah problemov v naravoslovnih znanostih ali humanistiki,
- obvlada številna in različna tehnična orodja v prostorskih analizah za reševanje praktičnih primerov, kot so na primer modeliranje porečij, raziskovanje ekosistemov, ekologija divjih živali, upravljanje z vodnimi viri, spremembe v rabi tal in pokrovnosti,
- zna samostojno uporabiti metode in tehnike v konkretni aplikaciji,
- razume stopnjo kakovosti (položajna natančnost, semantična popolnost) izvedenih informacij.

The objective of the course is to give methodological and practical knowledge in spatial analyses and spatial statistics with geographic information systems.

Students will acquire the following course specific competences:

- using modern mapping technologies,
- producing and interpreting basic thematic maps using GIS,
- understanding and applying fundamental principles of map design,
- using GIS as a tool in written and oral reports of spatial analyses concerning issues in natural sciences humanities,
- mastering a large and diverse suite of technical tools in geospatial data analysis, that can be used to solve practical problems, such as in watershed modelling, ecosystem science, wildlife ecology, water resource management, landscape ecology, conservation biology, and land-use and land-cover change, and
- conducting a competent practical assignment
- understanding a relevancy and quality of outputs (spatial accuracy, semantic accuracy).

Predvideni študijski rezultati:

Znanje in razumevanje

Znanje in razumevanje osnovnih konceptov povezanih z geografskimi informacijskimi sistemi in kartografijo.

Intended learning outcomes:

Knowledge and understanding

Students will be able to explain fundamental concepts related to cartography and geographic information systems.

Metode poučevanja in učenja:

- Predavanja: prosojnice, grafične ponazoritve, demonstracije, primeri iz prakse.
- Praktične vaje: računalniška učilnica
- e-izobraževanje

Learning and teaching methods:

- Lectures: in the classroom, use of modern teaching methods (slides, illustrations, demonstrations, case studies).
- Practical exercises: computer lab with professional equipment.
- e-learning

Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

• Izpit (teoretičen del) in/ali projekt (seminarska naloga).	60 %	• Written exam (theoretical part) and/or a seminar project.
• Naloge in sprotno delo (ocena vaj).	40 %	• Exercises and diagnostic assessment.

Reference nosilca / Lecturer's references:

1. **Kokalj, Ž.**, & Hesse, R. (2017). *Airborne laser scanning raster data visualization: a guide to good practice* (Vol. 14). Založba ZRC.
2. **Kokalj, Ž.**, & Somrak, M. (2019). Why not a single image? Combining visualizations to facilitate fieldwork and on-screen mapping. *Remote Sensing*, 11(7), 747.
3. Somrak, M., Džeroski, S., & **Kokalj, Ž.** (2020). Learning to classify structures in ALS-derived visualizations of ancient Maya Settlements with CNN. *Remote Sensing*, 12(14), 2215.
4. Verbovšek, T., Popit, T., & **Kokalj, Ž.** (2019). VAT Method for Visualization of Mass Movement Features: An Alternative to Hillshaded DEM. *Remote Sensing*, 11(24), 2946.
5. Stančič, L., Oštir, K., & **Kokalj, Ž.** (2020). Fluvial gravel bar mapping with spectral signal mixture analysis. *European Journal of Remote Sensing*, 1-16.