UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Geografski informacijski sistemi
Course title:	Geographic Information Systems

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Računalništvo in spletne tehnologije, visokošolski strokovni študijski program prve stopnje	-	Drugi ali tretji	Četrti ali šesti
Computer Science and Web Technologies, first cycle Professional Study Programme	-	Second or third	Fourth or sixth

Vrsta predmeta / Course type Izbirni / Elective

Univerzitetna koda predmeta / University course code: 2-RST-VS-IP-GIS-2020-05-14

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	-	45	-	-	105	6

Nosilec predmeta / Lecturer: izr. prof. dr. Tomaž Podobnikar

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski / Slovenian, Angleški / English
	Vaje / Tutorial:	Slovenski / Slovenian, Angleški / English

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

Pogoj za vključitev v delo je vpis v 2. letnik študija. Pogoj za pristop k izpitu so opravljene vse obveznosti na vajah.

Prerequisits:

Enrolment into the second year of the study. The student has to pass all requirements given at the exercises before the examination**.**

Vsebina:

- *Osnove GIS (geografskih informacijskih sistemov):*
  orodje za prostorske predstavitve, merilo/ločljivost, projekcije, koordinatni sistemi.
- *Podatki v GIS:*
  viri podatkov, zajem in vzdrževanje, struktura: vektorska/rastrska, hibridna, pretvorba med strukturami, algoritmi in

Content (Syllabus outline):

- *Introduction to GIS (geographic information systems):*
  a tool for the visualisation, scale/resolution, projections, coordinate systems.
- *Data in GIS:*
  data sources, capture and maintenance, structure: vector/raster, hybrid, conversion between formats,

struktura podatkov, organizacija po slojih, zbirke podatkov v GIS. • *Prostorske analize:* določanje in spreminjanje razredov, prekrivanje, algebra karte, Boolove operacije, ploskve oddaljenosti, združevanje osnovnih operacij. • *Digitalni model reliefa (DMR) kot pomemben sloj v GIS:* viri izdelave, lidarsko snemanje, zapis: točke, značilne črte, raster, TIN (nepravilna trikotniška mreža), hibrid, plastnice, interpolacija ploskve, osnove prostorskih analiz in prikaz DMR (naklon/ekspozicija, plastnice, profili, območja vidnosti, analitično senčenje). • *Osnove koncepta GIS in kakovosti:* konceptualizacija prostora geografskih razsežnosti, metode za analizo negotovosti, model kakovosti prostorskih podatkov, standardizacija podatkov. • *GIS kot orodje in kot znanstvena disciplina. GIS za vsakdanje potrebe:* Google maps, GNSS (Globalni navigacijski satelitski sistem), pametni telefoni in GIS, geomatika, ipd.	algorithms and data format, organization into layers, GIS databases. • *Spatial analysis:* classification, overlays, map algebra, Boolean operations, buffers, combining basic operations. • *Digital Terrain Model (DTM) as an important dataset in a GIS:* the sources of production, lidar, record to: points, characteristic lines, raster, TIN (triangulated irregular network), hybrid, contour lines, surface interpolation, basic spatial analysis and DTM visualisation (slope/aspect, contour lines, profiles, viewsheds, analytical shading). • *Basic concepts of GIS and quality:* conceptualization of geographic space, methods of uncertainty analysis, a model of spatial data quality, standardisation of data. • *GIS as a tool and as a scientific discipline. GIS for everyday needs:* Google Maps, GNSS (Global Navigation Satellite System), smart phones and GIS, geomatics, etc.

Temeljni literatura in viri / Readings:

- Bolstad, P. (2012). *GIS Fundamentals: A First Text on Geographic Information Systems* (4th ed.). White Bear lake, MN: Eider Press.
- Burrough, P. A. & McDonnell, R. A. (1998). *Principles of Geographical Information Systems*. Oxford University Press.
- DeMersis, M. N. (2011). *Fundamentals of Geographic Information Systems*. John Wiley & Sons.
- de Smith, M., Goodchild, M. & Longley, P. (2012). *Geospatial Analysis - a comprehensive guide*. SPLINT.
- Drobne, S. & Podobnikar, T. (1999). *Osnovni pojmi v geografskih informacijskih sistemih.* Ljubljana: Univerza v Ljubljani, Fakulteta za gradbeništvo za geodezijo. Pridobljeno iz http://www.fgg.uni-lj.si/sdrobne/GIS_Pojm/.
- GITTA (2012). *Geographic Information Technology Training Alliance*. Pridobljeno iz http://www.gitta.info.
- Kvamme, K., Oštir-Sedej, K., Stančič, Z. & Šumrada, R. (1997). *Geografski informacijski sistemi*. Založba ZRC.
- Longley, P. A., Goodchild, M. F., Maguire, D. J. & Rhind, D. W. (2015). *Geographic Information Systems and Science* (4th ed.). John Wiley & Sons.
- Mitchell, A. (2001-2012). *The Esri Guide to GIS Analysis* (Volume 1-3: Modeling Suitability, Movement, and Interaction). Redlands, CA: Esri Press.
- Šumrada, R. (2005). *Tehnologija GIS*. Ljubljana: Univerza v Ljubljani, Fakulteta za gradbeništvo in geodezijo.

- Različni uredniki, (od leta 1991 dalje) Zborniki »*Geografski informacijski sistemi v Sloveniji*«. Založba ZRC, Ljubljana.

Cilji in kompetence:	**Objectives and competences:**
Učna enota prispeva k razvoju naslednjih splošnih in predmetno-specifičnih kompetenc: *Splošne kompetence:* • poznavanje in osnovna uporaba geoprostorske informacijske tehnologije • poznavanje pomena kakovosti in prizadevanje za kakovost strokovnega dela skozi avtonomnost, samoiniciativnost, (samo)kritičnost, (samo)refleksivnost in (samo) evalviranje v strokovnem delu *Predmetno-specifične kompetence:* • poznavanje pridobivanja podatkov, analitičnih zmožnosti, izdelave modelov in pridobivanja želenih informacij • poznavanje in osnova uporabe programske opreme za GIS • razvijanje spretnosti pri analizah dejanskih problemov	*The instructional unit contributes to the development of the following general and subject-specific competences:* *General competences:* • knowledge of basic applications of the geospatial information technology • knowledge of the importance of quality, and striving for quality of professional work through autonomy, initiative, (self-) criticalness, (self) reflection and (self-) evaluation of the professional work *Subject-specific competences:* • getting knowledge in data acquisition, making models, their analytical ability, developing models, and extracting the desired information • getting knowledge in basic GIS-software application • developing skills for analysis of real problems
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: *Študent/študentka:* • spozna in razume zamisli, pomene, zmožnosti in uporabnosti prostorske (geografske) informatike – GIS kot sistema in orodja • nauči se osnove uporabe standardne programske opreme za GIS ter praktično aplicirati izbran problem	Knowledge and understanding: *The student:* • understands ideas, meanings, capabilities and usabilities of spatial (geographic) information technology – GIS as a system and a tool • is trained for the basics of using standard software for GIS and practical application of the selected problem
Metode poučevanja in učenja:	**Learning and teaching methods:**
• *predavanja* z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov) • *vaje* v računalniški učilnici: študentje bodo spoznali, preizkusili in reševali primere s katerimi bodo utrjevali snov s predavanj, ob uporabi standardne komercialne ali proste programske opreme. Te vaje bodo potekale v	• *lectures* with the active participation of students (presentation, discussion, questions, examples, problem solving) • *exercises* will be held in a computer laboratory: Students will learn, test, and deal with cases with which will consolidate the material from lectures, using standard commercial or free software. These exercises will be

manjših skupinah, tako da bo imel vsak študent na razpolago en računalnik • *domače naloge* in projektna naloga: z njimi bodo študentje s samostojnim delom utrdili znanje, pridobljeno na predavanjih in vajah	conducted in small groups so that each student is available to a single computer • *homework* and project work: students will consolidate the knowledge gained in class and through the practical work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): • pisni izpit • domače naloge Študent lahko opravi izpit, če domače naloge opravi dovolj dobro (več kot 50 % možnih točk). Pri tem se za končno oceno upošteva tehtano povprečje točk domačih nalog in izpita.	 70 30	Type (examination, oral, coursework, project): • written exam • homework Student can pass the exam by doing homework good enough (receives more than 50 % of possible points). The final grade is obtained based on a weighted average of the exam and homework.

Reference nosilca / Lecturer's references:

- ŠARLAH, N., PODOBNIKAR, T., MONGUS, D., AMBROŽIČ, T., MUŠIČ, B. 2019: Kinematic GPR-TPS Model for Infrastructure Asset Identification with High 3D Georeference Accuracy Developed in a Real Urban Test Field. Remote Sens, 11(12), doi: 10.3390/rs11121457.
- ŠTURM, Tomaž, PODOBNIKAR, Tomaž. A probability model for long-term forest fire occurrence in the Karst forest management area of Slovenia. The International journal of wildland fire, ISSN 1049-8001, 2017, vol. 26, iss. 5, str. 399-412, ilustr. https://doi.org/10.1071/WF15192, doi: 10.1071/WF15192.
- PODOBNIKAR, Tomaž. Detecting mountain peaks and delineating their shapes using digital elevation models, remote sensing and geographic information systems using autometric methodological procedures. Remote sensing, ISSN 2072-4292, 2012, vol. 4, issue 3, str. 784-809, ilustr. http://www.mdpi.com/2072-4292/4/3/784/, doi: 10.3390/rs4030784.
- SOMODI, I., ČARNI, Andraž, RIBEIRO, Daniela, PODOBNIKAR, Tomaž. Recognition of the invasive species Robinia pseudacacia from combined remote sensing and GIS sources. Biological Conservation, ISSN 0006-3207. [Print ed.], 2012, vol. 150, issue 1, str. 59-67, ilustr., doi: 10.1016/j.biocon.2012.02.014.
- PODOBNIKAR, Tomaž, SZÉKELY, Balázs. Towards the automated geomorphometric extraction of talus slopes in Martian landscapes. Planetary and Space Science, ISSN 0032-0633. [Print ed.], jan. 2015, letn. 105, str. 148-158, doi: 10.1016/j.pss.2014.11.019.
- SMOLE, Domen, ČEH, Marjan, PODOBNIKAR, Tomaž. Evaluation of inductive logic programming for information extraction from natural language texts to support spatial data recommendation services. International journal of geographical information science, ISSN 1365-8816, 2011, vol. 25, issue 11, str. 1809-1827, doi: 10.1080/13658816.2011.556640.
- PODOBNIKAR, Tomaž. Historical maps of Ljubljana for GIS applications. Acta geodaetica et geophysica Hungarica, ISSN 1217-8977, 2010, vol. 45, no. 1, str. 80-88, ilustr. http://www.akademiai.com/content/nt/jg27865618u1/?sortorder=asc&p_o=10, doi: 10.1556/AGeod.45.2010.1.12.

- PODOBNIKAR, Tomaž. Multidirectional visibility index for analytical shading enhancement. The cartographic journal, ISSN 0008-7041, avg. 2012, vol. 49, no. 3, str. 195-207, ilustr.