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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** |
| **Ime predmeta:** | GEOGRAFSKI INFORMACIJSKI SISTEMI  |
| **Course title:** | GEOGRAPHICAL INFORMATION SYSTEMS |
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| **Študijski program in stopnja****Study programme and cycle** | **Študijska smer****Study option** | **Letnik****Year of study** | **Semester****Semester** |
| LOGISTIKA SISTEMOV 1. stopnja |  | 2. | 4. |
| SYSTEM LOGISTICS 1st degree |  | 2. | 4. |
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| **Vrsta predmeta (obvezni ali izbirni) /** **Course type (compulsory or elective)** | OBVEZNI |
| COMPULSORY |
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| **Univerzitetna koda predmeta / University course code:** | UN |
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| **Predavanja****Lectures** | **Seminar****Seminar** | **Vaje****Tutorial** | **Klinične vaje****Clinical training** | **Druge oblike študija****Other forms of study** | **Samost. delo****Individual work** |  | **ECTS** |
| 12 e-P18 a-P |  | 18 e-V27 a-V |  |  | 105 |  | 6 |
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| **Nosilec predmeta / Course coordinator:** | **KLEMEN PRAH** |
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| **Jeziki /Languages:** | **Predavanja / Lectures:** | SLOVENSKI/SLOVENE |
| **Vaje / Tutorial:** | SLOVENSKI/SLOVENE |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** |  | **Prerequisites for enrolling in the course or for performing study obligations:** |
| Ni pogojev. |  | None. |
| **Vsebina (kratek pregled učnega načrta):**  |  | **Content (syllabus outline):** |
| 1. Koncept in razvoj GIS
2. Prostorski podatki (vrste, zajemanje, dostopanje, umeščenost v prostor, podatkovni modeli, uporaba)
3. Primeri rabe GIS v logistiki
4. Sodobna GIS analiza v logistiki:
	* Načrtovanje projekta, pregled literature iz izbira metodologije
	* Sodelovanje z institucijami in terensko delo
	* Analitični postopki in orodja
	* Priprava poročila
5. Osnove prostorskega modeliranja logističnega procesa z GIS, izgradnja modela in analiza.
6. GIS programska oprema: lastniška (ArcGIS Pro) in odprtokodna (QGIS, GRASS GIS)
7. Geovizualizacija
 |  | 1. Concept and development of GIS
2. Spatial data (types, capturing, accessing, spatial reference, spatial data models, usage)
3. Examples of GIS in logistics
4. Contemporary GIS analysis in logistics:
* GIS project design, literature review and methodology selection
* Cooperation with institutions and field work
* Analytical approaches and tools
* Report creation
1. Basics of spatial modeling of logistics process with GIS, model building and analysis.
2. GIS software: proprietary (ArcGIS Pro) and open source (QGIS, GRASS GIS)
3. Geovisualization
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| **Temeljni literatura in viri / Reading materials:** |
| 1. Bolstad, P. (2019). GIS fundamentals: a first text on geographic information systems (6th ed., str. XIV, 764). Eider; XanEdu. https://www.paulbolstad.net/gisbook.html
2. Longley, P.A., Goodchild, M.F., Maguire, D.J., Rhind, D.W., 2015. Geographic Information Systems & Science. Fourth edition. Wiley.
3. Mitchell, A., Griffin, L.S., 2021. ESRI Guide to GIS Analysis, Volume 2: Spatial Measurements and Statistics. Second edition. Esri Press.
4. Modeliranje pokrajine (2020). GIS v Sloveniji 15. Rok Ciglič (Ur.), Matjaž Geršič (Ur.), Drago Perko (Ur.), Matija Zorn (Ur.). ZRC SAZU.
5. Esri. (b.d.). ArcGIS Pro. Get Started. <https://pro.arcgis.com/en/pro-app/latest/get-started/get-started.htm>
6. Esri. (b.d.). ArcGIS Pro. Help. <https://pro.arcgis.com/en/pro-app/latest/help/main/welcome-to-the-arcgis-pro-app-help.htm>
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| **Cilji in kompetence:** |  | **Objectives and competences:** |
| Cilji predmeta so:* razumevanje osnovnih konceptov GIS in razvoja GIS
* poznavanje, zbiranje in raba prostorskih podatkov
* razumevanje in apliciranje prostorskih referenc prostorskih podatkov
* poznavanje GIS podatkovnih modelov
* interpretacija primerov uporabe GIS v logistiki
* načrtovanje in izvedba GIS analize v logistiki ter priprava poročila
* koncipiranje in izgradnja osnovnega modela logističnega procesa z GIS ter uporaba modela
* poznavanje in raba lastniške in odprtokodne GIS programske opreme
* geovizualiziranje prostorskih informacij

Kompetence, ki jih študenti osvojijo:* razvijajo geoprostorske predstave na področju logističnih objektov in procesov
* poznajo, pridobijo in uporabijo digitalne geoprostorske podatke
* razvijajo napredno delo z GIS v logistiki, vključno z analizo in modeliranjem
* razvijajo geovizualizacijske sposobnosti
 |  | The aims of this course are:* understanding basic GIS concepts and development of GIS
* knowledge, collection and usage of spatial data
* knowledge and application of georeferences
* knowledge of GIS data models
* interpretation of the examples of the use of GIS in logistics
* planning and performing GIS analysis in logistics and creation of report
* conception and building a basic model of the logistics process with GIS and using the model
* knowledge and use of proprietary and open source GIS software
* practicing geovisualization of spatial information

Competences acquired by students:* develop geospatial representations in the field of logistics facilities and processes
* know, acquire and use digital geospatial data
* develop advanced work with GIS in logistics, including analysis and modeling
* develop geovisualization skills
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| **Predvideni študijski rezultati:** |  | **Intended learning outcomes:** |
| Študent bo ob zaključku predmeta zmožen:* opisati in razložiti osnovne koncepte GIS
* razvrstiti in opisati glavne mejnike v razvoju GIS
* poznati, pridobiti in uporabiti različne vrste prostorskih podatkov
* razumeti, primerjati in uporabiti kartografske projekcije, koordinatne sisteme in geodetske datume
* poznati, izbrati in uporabiti GIS podatkovne modele
* poiskati in interpretirati primere uporabe GIS v logistiki
* načrtovati in sodelovati pri izvedbi GIS analize v logistiki
* ustrezno izbrati in uporabiti GIS analitična orodja
* sodelovati pri pripravi poročila o izvedbi analize
* koncipirati in zgraditi model logističnega procesa z GIS; pri tem uporabiti ustrezno GIS orodje za modeliranje
* uporabiti model in interpretirati rezultate
* poznati in kritično obravnavati GIS računalniške programe; pri tem uporabiti en lastniški in en odprtokodni program
* operirati z orodji za interaktivno prikazovanje prostorskih informacij in pripraviti končni zemljevid

Prenosljive/ključne spretnosti:* usposobijo se za delo z GIS v bodočem službenem (logističnem) okolju
* usposobijo se za uporabo GIS pri osebnem vseživljenjskem izpopolnjevanju
* uporabiti znanje s področja GIS pri drugih študijskih predmetih in pri nadaljevanju študija na magistrskem programu
 |  | At the end of the course the student will be able to:* describe and explain basic GIS concepts
* classify and describe the main milestones in the development of GIS
* know, acquire and use different types of spatial data
* understand, compare and use map projections, coordinate systems and datums
* know, select and use GIS data models
* find and interpret examples of the use of GIS in logistics
* plan and participate in the implementation of GIS analysis in logistics
* choose and use GIS analytical tools appropriately
* participate in the preparation of a report on the performance of the analysis
* to conceive and build a logistic process model with GIS; to use an appropriate GIS tool for modeling
* apply the model and interpret the results
* know and critically consider GIS computer programs; use one proprietary and one open source program
* operate with tools for interactive display of spatial information and prepare the final map

Transferable/Key skills:* qualify to work with GIS in the future employment (logistics) environment
* qualify to use GIS in personal lifelong development
* apply knowledge and skills in the field of GIS in other study subjects and in continuing studies in the master's program
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| **Metode poučevanja in učenja:** |  | **Learning and teaching methods:** |
| Predavanja: pri predavanjih študent spozna teoretične vsebine predmeta. Del predavanj se izvaja na klasični način v predavalnici, del pa v obliki e-predavanj. Pri klasičnih in e-predavanjih pridejo do izraza: - načelo raznovrstnosti učnih gradiv,- načelo relevantnih in najsodobnejših vsebin,- pristop analize sprememb v prostoru in času (t.i. Wayback Image),- pristop ustvarjanja miselnih shem,- študije primerov. Vaje: pri vajah študent utrdi teoretično znanje in spozna aplikativne možnosti. Del vaj se izvaja na klasični način v računalniški učilnici, del pa v obliki e-vaj. V sklopu vaj bo tudi izvedeno terensko delo z namenom GIS analize v logistiki na konkretnem lokalnem primeru, pri čemer se sledi metodi izkustvenega učenja. Pri vajah tudi pride do izraza pristop različnih kartografskih meril (lokalno/globalno). |  | Lectures: during the lectures, the student learns the theoretical content of the course. Part of the lectures are conducted in a classroom, and part in the form of e-lectures. In classic and e-lectures, the following is expressed: - the principle of diversity of teaching materials,- the principle of relevant and up-to-date content,- the approach of analyzing changes in space and time (i.e. Wayback Image),- the approach of creating mental schemes,- case studies.Tutorials: in tutorials, the student consolidates theoretical knowledge and learns about application possibilities. Part of the tutorials is carried out in a computer classroom, and part in the form of e-tutorials. As part of tutorials, a field work is carried out with the aim of GIS analysis on a local case, following the method of experiential learning. In tutorials, an approach of different cartographic scales (local/global) is also expressed. |
| **Načini ocenjevanja:** | Delež (v %) /Share (in %) | **Assessment methods:** |
| * Opravljene obveznosti e-predavanj in e-vaj so pogoj za pristop k izpitu.
* Teoretični del izpita (pisno).
* Praktični del izpita.
* Projektna naloga.
* Teoretični in praktični del izpita morata biti vsak posebej pozitivna.
 | 35%35%30% | * Successful completion of e-lectures and e-tutorials is a prerequisite for entering the exam.
* Theoretical examination (written).
* Practical examination.
* Project work.
* Theoretical and practical examination must be individually positive.
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| **Reference nosilca / Course coordinator's references:**  |
| 1. PRAH, Klemen, KMETEC, Mark, KNEZ, Matjaž. Electric vehicle charging stations coverage : a study of Slovenia. Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 2022, vol. 29, no. 1, str. 285-292, ilustr. ISSN 1330-3651. <https://doi.org/10.17559/TV-20200518121739> , DOI: 10.17559/TV-20200518121739.2. ŠINKO, Simona, PRAH, Klemen, KRAMBERGER, Tomaž. Spatial modelling of modal shift due to COVID-19. Sustainability. 2021, vol. 13, iss. 13, str. 1-15, ilustr. ISSN 2071-1050. https://doi.org/10.3390/su13137116, DOI: 10.3390/su13137116. 3. ŠINKO, Simona, RUPNIK, Bojan, PRAH, Klemen, KRAMBERGER, Tomaž. Spatial modelling of the transport mode choice : application on the Vienna transport network. Transport. [Online ed.]. 2021, vol. 36, iss. 5, 386-394 str., ilustr. ISSN 1648-3480. https://doi.org/10.3846/transport.2021.16128, DOI: 10.3846/transport.2021.16128. 4. PRAH, Klemen (avtor, kartograf), KRAMBERGER, Tomaž, DRAGAN, Dejan. Primerjava 2D in 3D GIS modela pri načrtovanju šolskih prevozov. Dela. [Tiskana izd.]. 2018, [št.] 49, str. 61-74, ilustr. ISSN 0354-0596. https://doi.org/10.4312/dela.49.61-74, DOI: 10.4312/dela.49.61-74.5. PRAH, Klemen, SHORTRIDGE, Ashton. Travels in San Francisco : effect of terrain on road network distance. V: 2019 East Lakes Division of the American Association of Geographers Annual Meeting, October 10-11, 2019, University Center, Michigan. [Saginaw: College of Arts & Behavioral Sciences, 2019]. Str. 33. |