UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Ime predmeta:	**GIS za strateške odločitve v logistiki**
Course title:	**GIS for strategic decisions in logistics**

Študijski program in stopnja Study programme and cycle	Študijska smer Study option	Letnik Year of study	Semester Semester
LOGISTIKA SISTEMOV 2. stopnja		1	2
SYSTEM LOGISTICS 2nd degree		1	2

Vrsta predmeta (obvezni ali izbirni) / Course type (compulsory or elective)	OBVEZNI COMPULSORY
Univerzitetna koda predmeta / University course code:	MAG

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Clinical training	Druge oblike študija Other forms of study	Samost. delo Individual work	ECTS
18 e-P 27 a-P		13 e-V 27 a-V			125	7

Nosilec predmeta / Course coordinator:	**KLEMEN PRAH**
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):**
• Izzivi velikih geoprostorskih podatkovnih zbirk (opredelitev, uporaba v okviru pametnih skupnosti) • GIS prostorske analize in merjenja (opredelitev, vrste (prostorska porazdelitev, vzorci, gruče, prostorski odnosi), uporaba) • Napredne metode GIS-T (opredelitev, vrste (mrežni model, VRP problem, ugotavljanje lokacije), uporaba)) • Kartiranje pametnih mest in skupnosti (opredelitev in uporaba (lokacijska perspektiva dejavnosti v realnem času, pametno usmerjanje vozil in pripravljenost na tveganja, ugotavljanje optimalnih lokacij, vizualizacija in kartiranje senzorskih podatkov, množični dogodki, 3D vizualizacija)	• Challenges of big geospatial databases (definition, use within smart communities) • GIS spatial analysis and measurement (definition, types (spatial distribution, patterns, clusters, spatial relationships), application) • Advanced GIS-T methods (definition, types (network model, VRP problem, finding location), application)) • Mapping for smart cities and communities (definition and use (location perspective on real-time field activities, smart routing and prepareness for risks, finding optimal locations, visualization and mapping of sensor data, mass events, 3D visualization)

• Kartiranje poslovnega okolja (opredelitev, uporaba (optimizacija »notranjih« transportnih poti, varnost v (med)skladiščnem transportu, oblikovanje transportnih poti (prometnic) in vzpostavitev logistične infrastrukture znotraj kompleksa podjetja, ugotavljanje optimalne lokacije logističnega (skladiščno-distribucijskega) centra)	• Mapping for business environment (definition, use (optimization of "internal" transport routes, safety in (inter)storage transport, design of transport routes (roads) and establishment of logistics infrastructure within the company complex, determining the optimal location of the logistics (storage and distribution) center)

Temeljni literatura in viri / Reading materials:

- Prah, K. GIS za strateške odločitve v logistiki. E-gradivo (v pripravi).
- Longely, P.A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. (2015). Geographic Information Systems & Science. 4th Edition. John Wiley & Sons.
- Werner, M. (Ed.), Chiang, Y.-Y. (Ed.) (2021). Handbook of Big Geospatial Data. Springer.
- Mitchell, A. (2005). ESRI Guide to GIS Analysis, Volume 2: Spatial Measurements and Statistics. Esri press.
- Law, M., Collins, A. (2018). Getting to Know ArcGIS Pro. Esri press.
- Rodrigue, J.-P. (2020). The Geography of Transport Systems. 5th Edition. Routledge.

Cilji in kompetence:	**Objectives and competences:**
Cilji predmeta so: • opredelitev velikih geoprostorskih podatkovnih zbirk in uporaba v okviru pametnih skupnosti; • razumevanje in uporaba izbranih prostorskih analiz in merjenj, kot so prostorska porazdelitev, vzorci, gruče in prostorski odnosi; • razumevanje in uporaba metodologije GIS-T in mrežnih modelov; • kartiranje pametnih mest in skupnosti z namenom analize in načrtovanja strateških odločitev; • GIS modeliranje poslovnega okolja za načrtovanje strateških transportno-logističnih odločitev. Kompetence, ki jih pridobijo študenti: • razvijajo geovizualizacijske sposobnosti; • razvijajo geoprostorske predstave na področju pametnih skupnosti in poslovnih okolij; • razvijajo digitalno kompetenco naprednega dela z geoprostorskimi podatki in kartografskimi prikazi na primeru pametnih skupnosti in poslovnih okolij.	The objectives of the course are: • identification of big geospatial databases and use within smart communities; • understanding and using selected spatial analyzes and measurements, such as spatial distribution, patterns, clusters and spatial relationships; • understanding and applying GIS-T methodology and network models; • mapping smart cities and communities for the purpose of analyzing and planning strategic decisions; • GIS modeling of the business environment for planning strategic transport-logistics decisions. Competences acquired by students: • develop geovisualization skills; • develop geospatial thinking in the field of smart communities and business environments; • develop digital competence of advanced work with geospatial data and cartographic representations in the case of smart communities and business environments.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje:	Knowledge and understanding:

Študent bo ob zaključku predmeta zmožen:	The student will be able to:
• opredeliti in uporabiti podatke velikih geoprostorskih zbirk pri strateških logističnih odločitvah; • aplicirati izbrane prostorske analize in merjenja na primere pametnih skupnosti in poslovnih okolij; • analizirati in načrtovati z izbranimi metodami GIS-T; • kartirati pametna mesta in skupnosti v smislu strateških logističnih odločitev, dejavnosti v realnem času, pametnega usmerjanja vozil, ugotavljanja lokacij, množičnih dogodkov in 3D vizualizacije; • modelirati poslovno okolje v smislu optimizacije "notranjih" transportnih poti, varnosti v (med)skladiščnem transportu, oblikovanja transportnih poti in vzpostavitve logistične infrastrukture znotraj kompleksa podjetja, ugotavljanja optimalne lokacije logističnega (skladiščno-distribucijskega) centra; • uporabljati sodobno programsko opremo Esri ArcGIS z razširitvami, v povezavi z nekaterimi znanji SQL, VBScript in Python; uporabiti računalniški program QGIS pri kartografskih transformacijah.	• identify and use data from big geospatial databases in strategic logistics decisions; • apply selected spatial analyzes and measurements to examples of smart communities and business environments; • analyze and plan with selected GIS-T methods; • map smart cities and communities in terms of strategic logistics decisions, real-time activities, smart vehicle routing, location finding, mass events and 3D visualization; • model the business environment in terms of optimizing "internal" transport routes, risks in (inter)warehousing, designing transport routes and establishing logistics infrastructure within the company complex, determining the optimal location of the logistics (warehousing-distribution) center; • use modern Esri ArcGIS software with extensions, in conjunction with some SQL, VBScript and Python skills; use the computer program QGIS in cartographic transformations.

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; e-predavanja se lahko izvajajo na videokonferenčni način ali s pomočjo posebej v ta namen didaktično pripravljenih e-gradiv v virtualnem elektronskem učnem okolju. Vaje: pri vajah študent utrdi teoretično znanje in spozna aplikativne možnosti. Praktične strokovne ekskurzije v podjetja. Del vaj se izvaja na klasični način v predavalnici, del pa v obliki e-vaj (e-vaje se lahko izvajajo na videokonferenčni način ali s pomočjo posebej v ta namen didaktično pripravljenih e-gradiv v virtualnem elektronskem učnem okolju).	Lectures: Students understand the theoretical frameworks of the course. Part of the lecture course is held in standard classroom while the rest is in the form of e-learning (e-lectures may be given via videoconferencing or with the help of specially designed e-material in a virtual electronic learning environment). Tutorials: Students enhance their theoretical knowledge and are able to apply it. Practical professional excursions to companies. Part of the seminar is in a classroom while the rest is in the form of e-learning (e-tutorials may be given via video-conferencing or with the help of specially designed e-material in a virtual electronic learning environment).

Načini ocenjevanja:	Delež (v %) / Share (in %)	**Assessment methods:**

Opravljene obveznosti e-predavanj in e-vaj so pogoj za pristop k izpitu.		Successful completion of e-lectures and e-tutorials is a prerequisite for entering the exam.
Pisni del izpita iz teorije	**35%**	Written examination from theory
Pisni del izpita z GIS programom	**35%**	Written examination wit GIS program
Raziskovalna naloga	**30%**	Research work
Za pozitivno oceno predmeta mora biti pozitiven vsak pisni del izpita posebej.		For a positive assessment of the subject, each written part of the exam must be positive.

Reference nosilca / Course coordinator's references:

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.

PRAH, Klemen, 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. [COBISS.SI-ID 512964413].

PRAH, Klemen, KESHAVARZSALEH, Abolfazl, KRAMBERGER, Tomaž, JEREB, Borut, DRAGAN, Dejan. Optimal bus stops' allocation : a school bus routing problem with respect to terrain elevation. Logistics & sustainable transport. [Spletna izd.]. October 2018, vol. 9, no. 2, str. 1-15, ilustr. ISSN 2232-4968. https://www.degruyter.com/view/j/jlst.2018.9.issue-2/jlst-2018-0006/jlst-2018-0006.xml?format=INT, DOI: 10.2478/jlst-2018-0006. [COBISS.SI-ID 512943677].

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. [COBISS.SI-ID 513048637].

PRAH, Klemen, KRAMBERGER, Tomaž, RUPNIK, Bojan. The role of GIS in port hinterland modelling based on port choice. V: VIDOVIĆ, Milorad (ur.). Proceedings of the 3rd Logistics International Conference, Belgrade, 25-27 May, 2017. Belgrade: Faculty of Transport and Traffic Engineering, 2017. Str. 111-116, ilustr. ISBN 978-86-7395-373-1. http://logic.sf.bg.ac.rs/wp-content/uploads/2017/LOGIC%202017%20Proceedings%20b5.pdf.