UČNI NAČRT PREDMETA/COURSE SYLLABUS	
Predmet:	OSNOVE PROSTORSKEGA MODELIRANJA
Course title:	BASICS OF SPATIAL MODELLING

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
GOSPODARSKA IN TEHNIŠKA LOGISTIKA 1.stopnja		2.	3.
PROFESSIONAL HIGHER EDUCATION STUDY PROGRAMME ECONOMIC AND TECHNICAL LOGISTICS 1st degree		2.	3.

Vrsta predmeta / Course type	OBVEZNI
Univerzitetna koda predmeta / University course code:	VS

Predavanja Lectures	Seminar Seminar	vaje Tutorial	Klinične vaje Laboratory work	Druge oblike študija Field work	Samost. delo Individ. work	ECTS
15 e-P 15 a-P		18 e-V 27 a-V			135	7

Nosilec predmeta / Lecturer:	KLEMEN PRAH
Jeziki / Languages: Predavanja / Lectures:	SLOVENSKI / SLOVENE
Vaje / Tutorial:	SLOVENSKI / SLOVENE

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisits:
Ni pogojev.	None.

Vsebina:	Content (Syllabus outline):
• Osnove matematičnega modeliranja logističnih procesov. • Osnove teorije grafov kot orodje za modeliranje. • Algoritmi za optimizacijo logističnih modelov. • Teoretično – metodološke osnove GIS-a. • Aplikacija modelov in njihova optimizacija v GIS-u.	• Basics of mathematical modelling of logistics processes. • Basics of graph theory as a tool for modelling. • Algorithms for optimisation of logistics models. • Theoretic-methodological basics of GIS. • Model application and their optimisation in GIS.

Temeljni literatura in viri / Readings:

1. E-gradivo predmeta.
2. Heywood, I., Cornelius, S., Carver, S.,2011. An Introduction to Geographical Information Systems. Fourth edition. Pearson.
3. Kvamme K., Oštir-Sedej, K., Stančič, Z., Šumrada, R., 1997. Geografski informacijski sistemi. Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti Ljubljana, 19-21.
4. Wilson, R.J., Watkins, J.J., Graphs, An introductionary approach, John Wiley, New York, 1990. (Slovene translation: Uvod v teorijo grafov, DMFA Ljubljana 1997.)
5. ArcGIS Desktop ArcMap https://desktop.arcgis.com/en/arcmap/
6. ArcGIS Pro: https://www.esri.com/en-us/arcgis/products/arcgis-pro/resources

Cilji in kompetence:	Objectives and competences:
Študenti: • spoznajo osnove modeliranja logističnih procesov, izgradnjo modelov in njihovo optimizacijo,	Students: • are farmiliarized with the basics of modelling logistics processes and their optimization,

• spoznajo osnovna matematična orodja za modeliranje in se naučijo izgraditi modeli enostavnih logističnih procesov, • spoznajo osnove Geografskih informacijskih sistemov in njihovo uporabo v logistiki, naučijo se aplicirati izgrajene modeli v GIS-u.	• are farmiliarized with the basic mathematical tools for modelling and learn to create models for simple logistics processes, • learn about the basics of GIS and their use in logistics, they learn to apply their models to practical situations using GIS.

Predvideni študijski rezultati:	Intended learning outcomes:
Študenti znajo: • pojasniti vlogo in pomen GIS modeliranja v logistiki, • opredeliti namen in osnove GOS-a, • spoznajo osnove GIS-a, • uporabiti osnovna orodja GIS-a za modeliranje osnovnih logističnih problemov.	Students learn: • how to explain the role and importance of GIS , • about the purpose and basics of GIS, • to get to know the basics of GIS, • use the basic GIS tools for modelling basic, • logistics problems.

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. 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 in a classroom while the rest is in the form of e-learning (e-lectures may be given via video-conferencing 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. 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 %) / Weight (in %)	Assessment:
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.
• Teoretični del izpita (pisno). • Praktični del izpita. • Seminarska naloga	35% 35% 30%	• Theoretical examination (written). • Practical examination. • Seminar paper.
Teoretični in praktični del izpita morata biti vsak posebej pozitivna.		Theoretical and practical examination must be individually positive.

Reference nosilca / Lecturer's references:

1. KRAMBERGER, Tomaž, ŽEROVNIK, Janez. Priority constrained Chinese postman problem. *Logistics and sustainable transport*, 22-05-07, vol. 1, no 1, 15 str.
2. KRAMBERGER, Tomaž, ŽEROVNIK, Janez. A contribution to environmentally friendly winter road maintenance: optimizing road de-icing. *Transp. res., Part D Transp. environ.* [Print ed.], July 2008, vol. 13, iss. 5, str. 340-346. http://dx.doi.org/10.1016/j.trd.2008.03.007, doi: 10.1016/j.trd.2008.03.007.
3. KRAMBERGER, Tomaž, ŠTRUBELJ, Gregor, ŽEROVNIK, Janez. Chinese postman problem with priority nodes. *Fund. Computing Decis. Sci.*, 2009, vol. 34, no. 4, str. 233-264.
4. KRAMBERGER, Tomaž, DRAGAN, Dejan, PRAH, Klemen. A heuristic approach to reduce carbon dioxide emissions. Proceedings of the Institution of Civil Engineers - Transport, ISSN 0965-092X. [Print ed.], Okt. 2014, vol. 167, iss. 5, str. 296-305. http://www.icevirtuallibrary.com/content/article/10.1680/tran.11.00053 , doi: 10.1680/tran.11.00053. [COBISS.SI-ID 512554557]

5. KRAMBERGER, Tomaž, ŽEROVNIK, Janez, ŠTRUBELJ, Gregor, PRAH, Klemen. GIS technology as an environment for testing an advanced mathematical model for optimization of road maintenance. Central European Journal of Operations Research, ISSN 1435-246X, June 2013, vol. 21, issue 1-Supplement, str. 59-73, doi: 10.1007/s10100-012-0265-4. [COBISS.SI-ID 512429885]