UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)			
Predmet:	Operacijske raziskave		
Course title:	Operational research		
Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Univerzitetni študijski program Finančna matematika	ni smeri	3	drugi
First cycle academic study programme Financial Mathematics	none	3	second

Vrsta predmeta / Course type	obvezni / compulsory
Univerzitetna koda predmeta / University course code:	M0322

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike študija**	**Samost. delo** **Individ. work**	**ECTS**
45		**45**			**90**	**6**

Nosilec predmeta / Lecturer:	prof. dr. Vladimir Batagelj, prof. dr. Sergio Cabello Justo

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v letnik študija.	Enrolment in the programme.
Vsebina:	**Content (Syllabus outline):**

Modeliranje problemov iz resničnega življenja. Celoštevilsko linearno programiranje. Dinamično programiranje. Najkrajše poti v grafih. Topološko urejanje. Osnovne teorije odločanja.Dodatne teme so izbrane z naslednjega seznama: Trdna prirejanja in posplošitve. Predstavitev podatkov. Načrtovanje projektov (CPM/PERT). Poštena delitev. Vodenje zalog. Večkriterijska optimizacija. Razvrščanje. Razmeščanje. Uporaba markovskih verig. Simulacije. Napovedovanje. Načrtovanje poskusov. Vsak študent spozna tudi temo svojega projekta.	Modelling real-world problems. Integer linear programming. Dynamic programming. Shortest paths in graphs. Topological sorting. Basic decision theory.Additional topics selected from the following list: Stable matchings. Data presentation. Project management (CPM/PERT). Fair division. Inventory theory. Multicriteria Optimization. Scheduling. Facility location. Applications of Markov chains. Simulations. Forecasting. Design of experiments.Each student also studies the topic of his or her project.

Temeljni literatura in viri / Readings:

V. Batagelj: Operacijske raziskave. Skripta v pripravi. http://vlado.fmf.uni-lj.si/vlado/or/or.htm

D. C. Montgomery: Design and analysis of experiments. John Wiley &, Sons, 1997.

F.S. Hillier in G.J. Lieberman: Introduction to operations research. McGraw-Hill Higher Education, 2010.

W.L. Winston: Operation Research, Applications and Algorithms. PWS-KENT, Boston, MA 1991.

F.S. Roberts: Discrete Mathematical Models. Prentice-Hall, Englewood Cliffs, New Jersey, 1976.

T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein: Introduction to Algorithms, 2. izdaja, MIT Press, Cambridge, 2001.

Cilji in kompetence:

Uvod v modele, metodologijo in orodja, ki se uporabljajo v operacijskih raziskavah.

Objectives and competences:

Introduction to the models, methodology and tools used in operations research.

Predvideni študijski rezultati:

Znanje in razumevanje: Razumevanje modelov, metodologij in orodij, ki se uporabljajo v operacijskih raziskavahUporaba: Metodično reševanje problemov vsakdanjega življenja, ki so povezani z iskanjem optimalnega vodenja določenega sistema.
Refleksija: Povezanost med teoretičnimi napovedmi o optimalnem vodenju in dejanskim obnašanjem sistema.

Prenosljive spretnosti – niso vezane le na en predmet: Pomen metodičnega reševanja vsakdanjih problemov.

Intended learning outcomes:

Knowledge and understanding: Understanding of models, methodologies and tools used in operations research

Applications: Methodical approach to problem solving related to optimal managing of systems in everyday life.

Reflection: The relation between theoretical predictions on the optimal management and the actual behavior of the system

Transferable skills: Relevance of a methodical approach to problem solving.

Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja, vaje, projekt, domače naloge, konzultacije	Lectures, exercises, project, homework, consultations

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
projektno delo	25%	project
izpit iz vaj	35%	written exam
izpit iz teorije	40%	oral exam
ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)		grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

PLESTENJAK, Bor, BATAGELJ, Vladimir. Optimal arrangements of n-points on a sphere and in a circle. V: The 6th International Symposium on Operational Research in Slovenia, Preddvor, Slovenia, September 26-28, 2001. LENART, Ladislav (ur.), ZADNIK STIRN, Lidija (ur.), DROBNE, Samo (ur.). SOR '01 proceedings. Ljubljana: Slovenian Society Informatika, Section for Operational Research, 2001, str. 83-88. [COBISS.SI-ID 11140441]

BATAGELJ, Vladimir. Integer turbine balancing problems. V: BARLOTTI, A. (ur.). Combinatorics '88 : proceedings of the international conference on incidence geometrics and combinatorial structures, Ravello, Italy 23-28 May, 1988. Vol. 1. Rende: Mediterranean press, cop. 1991, str. 125-133. [COBISS.SI-ID 8159833]

BATAGELJ, Vladimir, FERLIGOJ, Anuška. Agglomerative hierarchical multicriteria clustering using decision rules. V: 9th Symposium on Computational Statistics, Dubrovnik, 1990. MOMIROVIĆ, Konstantin (ur.), MILDNER, Vesna (ur.). COMPSTAT : proceedings in Computational Statistics, 9th Symposium held at Dubrovnik, Yugoslavia, 1990. Heidelberg: Physica-Verlag, 1990, str. 15-20. [COBISS.SI-ID 17051485]

VRANJEŠ, Božo, PISANSKI, Tomaž, BATAGELJ, Vladimir. Postupak za oblikovanje prostornih struktura, za slučaj problema sa ograničenjima. V: Zbornik radova : [saopštenja Prvog Naučno-stručnog skupa Projektovanje proizvodnih sistema - PPS '77, Novi Sad, 12-14 oktobar 1977]. Novi Sad: Institut za proizvodno mašinstvo Fakulteta tehničkih nauka, 1977, str. 303-318. [COBISS.SI-ID 8288601]

CABELLO, Sergio, ROTE, Günter. Obnoxious centers in graphs. SIAM journal on discrete

mathematics, ISSN 0895-4801, 2010, vol. 24, no. 4, str. 1713-1730. [COBISS.SI-ID 15762265]

BUCHIN, Kevin, CABELLO, Sergio, GUDMUNDSSON, Joachim, LÖFFLER, Maarten, LUO, Jun, ROTE, Günter, SILVEIRA, Rodrigo I., SPECKMANN, Bettina, WOLLE, Thomas. Finding the most relevant fragments in networks. Journal of graph algorithms and applications, ISSN 1526-1719, 2010, vol. 14, no. 2, str. 307-336. [COBISS.SI-ID 15629401]

CABELLO, Sergio, DÍAZ-BÁÑEZ, José Miguel, LANGERMAN, Stefan, SEARA, Carlos, VENTURA, Inma. Facility location problems in the plane based on reverse nearest neighbor queries. European journal of operational research, ISSN 0377-2217. [Print ed.], 2010, vol. 202, iss. 1, str. 99-106. , doi: . [COBISS.SI-ID 15160921]