

OPERACIJSKE RAZISKAVE

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	OPERACIJSKE RAZISKAVE
Course title:	OPERATIONS RESEARCH
Članica nosilka/UL Member:	UL FS

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Strojništvo, tretja stopnja, doktorski	Proizvodno inženirske znanosti, kibernetika in mehatronika (smer)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0033462
Koda učne enote na članici/UL Member course code:	7307

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
90					160	10

Nosilec predmeta/Lecturer:	Janez Žerovnik
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Izvajalci predavanj:	Janez Povh, Janez Žerovnik
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:

Izbirni predmet /Elective course

Jeziki/Languages:

Predavanja/Lectures:

Angleščina, Slovenščina

Vaje/Tutorial:

Angleščina, Slovenščina

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

Veljajo splošni pogoji za doktorski študij.

General prerequisites for the third level studies.

Vsebina:**Content (Syllabus outline):**

Osnovni pojmi. Praktična naloga, matematični model, namenska funkcija, dopustne in optimalne rešitve. Lahki in težki optimizacijski problemi.

Linearno programiranje. Dualni program. Metoda simpleksov. Polinomski algoritmi za linearno programiranje. Zgledi uporabe. Zveza s celoštevilskim programiranjem.

Posplošitve linearnega programiranja. Stohastično programiranje. Dinamično programiranje.

Optimizacija nelinearnih modelov z zveznimi in odvedljivimi funkcijami.

Večkriterijska optimizacija. Osnovni pojmi, ciljno programiranje, funkcije koristnosti.

Dodatna poglavja: odločanje v negotovosti in s tveganjem, matrične igre, mehka logika...

Basic notions. Real world problem, mathematical model, goal function, feasible and optimal solutions. Tractable and hard optimization problems.

Linear programing. Dual program. Simplex method. Interior point methods. Applications. Relation with integer programing.

Generalizations of linear programing. Stochastic programing. Dynamical programing.

Optimization of nonlinear problems.

Multicriterial optimization. Basic notions, goal function, optimality criteria.

Additional chapters: desicison making with uncertainty and risk, matrix games, fuzzy logic...

Temeljna literatura in viri/Readings:

[1] Winston, W. L., 1994. Operations Research: Applications and algorithms, Duxbury, Belmont.

[2] Figueira, J., Greco, S., Ehrgott, M., 2005. Multiple criteria decision analysis., Springer.

[3] L. Zadnik-Stirn, Metode operacijskih raziskav za poslovno odločanje. Novo mesto: Visoka šola za upravljanje in poslovanje, 2001.

[4] Bohanec, M., 2006. Odločanje in modeli. DMFA, Ljubljana.

- [5] Omladič, V., 2002, matematika in odločanje, DMFA, Ljubljana.
- [6] E. Kreyszig: Advanced Engineering Mathematics, (9th edition), Wiley, New York 2006.
- [7] J.Hromkovič: Algorithmics for Hard Problems, Introduction to Combinatorial Optimization, Randomization, Approximation, and Heuristics, 2nd ed., Springer, Berlin 2004.

Cilji in kompetence:

Cilji:

Študentu prikazati vlogo in pomen matematičnega modeliranja za podporo optimalnemu odločanju s poudarkom na modeliranju z zveznimi funkcijami in linearnim programiranjem.

Kompetence:

Študent poglobi znanje s področja operacijskih raziskav in v seminarski nalogi samostojno reši optimizacijsko nalogo s širšega področja njegove disertacije.

Objectives and competences:

Goals:

The principal goal is to outline the role and importance of mathematical modelling for support in decision making.

Competences:

The student acquires basic knowledge of some topics from operations research and is able to solve an example of an optimization problem from his research area.

Predvideni študijski rezultati:

Študent poglobi znanje s področja operacijskih raziskav in v seminarski nalogi samostojno reši optimizacijsko nalogo s širšega področja njegove disertacije.

Intended learning outcomes:

The student acquires basic knowledge of some topics from operations research and is able to solve an example of an optimization problem from his research area.

Metode poučevanja in učenja:

Predavanja, laboratorijske vaje, seminarsko delo, e-izobraževanje, konzultacije. Seminarsko delo v čim večji meri navezuje se na področje doktorskega raziskovanja. Študij z uporabo priporočene literature.

Learning and teaching methods:

Lectures, laboratory practice & seminar work, e-education, consulting. The seminar work is related, as much as possible, to the student's doctoral research field. Study on a recommended literature basis.

Načini ocenjevanja:

Delež/ Weight

Assessment:

Predavanja, laboratorijske vaje, seminarsko delo, e-izobraževanje, konzultacije. Seminarsko delo v čim večji meri navezuje se na področje doktorskega raziskovanja. Študij z uporabo

Lectures, laboratory practice & seminar work, e-education, consulting. The seminar work is related, as much as possible, to the student's doctoral research field. Study on a recommended

priporočene literature. Lectures, laboratory practice & seminar work, e-education, consulting. The seminar work is related, as much as possible, to the student's doctoral research field. Study on a recommended literature basis.		literature basis.
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Reference nosilca/Lecturer's references:

prof. ddr. Janez ŽEROVNIK

PISANSKI, T., ZMAZEK, B., ŽEROVNIK, J. An algorithm for k-convex closure and an application. Int. j. comput. math., 2001, vol. 78, str. 1-11.

ZMAZEK, B., ŽEROVNIK, J. The obnoxious center problem on weighted cactus graphs. Discrete appl. math.. 2004, vol. 136, no. 2-3, str. 377-386.

DOBRAVEC, T., ŽEROVNIK, J., ROBIČ, B. An optimal message routing algorithm for circulant networks. J. systems archit.. [Print ed.], 2006, vol. 52, no. 5, str. [298]-306.

SAU WALLS, I., ŽEROVNIK, J. An optimal permutation routing algorithm on full-duplex hexagonal networks. Discret. math. theor. comput. sci. (Online), 2008, vol. 10, no. 3, str. 49-62.

KRAMBERGER, T., ŽEROVNIK, J. A contribution to environmentally friendly winter road maintenance: : optimizing road de-icing. Transp. res., Part D Transp. environ.. 2008, vol. 13, iss. 5, str. 340-346.