

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Ime predmeta: KVANTITATIVNO MODELIRANJE V LOGISTIKI
Course title: QUANTITATIVE MODELING IN LOGISTICS

Študijski program in stopnja Study programme and cycle	Študijska smer Study option	Letnik Year of study	Semester Semester
LOGISTIKA SISTEMOV 1. stopnja		2.	3.
SYSTEM LOGISTICS 1 st degree		2.	3.

**Vrsta predmeta (obvezni ali izbirni) /
Course type (compulsory or elective)**

OBVEZNI
COMPULSORY

Univerzitetna koda predmeta / University course code:

UN

Predavanja Lectures	Seminar Seminar	Vaje Tutorial			Klinične vaje Clinical training	Druge oblike študija Other forms of study	Samost. delo Individual work	ECTS
30 a-P 30 e-P		a-V	e-V	LV			150	8
		9	9	12				

Nosilec predmeta / Course coordinator:

TOMAŽ KRAMBERGER

Jeziki /Languages:

Predavanja / Lectures: SLOVENSKI/SLOVENE

Vaje / Tutorial: SLOVENSKI/SLOVENE

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

Ni pogojev.

Prerequisites for enrolling in the course or for performing study obligations:

None.

Vsebina (kratek pregled učnega načrta):

- Sistem linearnih enačb in neenačb (ponovitev reševanja sistemov linearnih enačb z več neznankami s pomočjo Gaussove eliminacijske metode in matričnih enačb, reševanje sistemov linearnih neenačb z grafično metodo),
- konveksne množice in določanje ekstremnih točk,
- linearno programiranje (formulacija problema, reševanje na grafični način, reševanje s programskim paketom LINGO in orodjem Microsoft Excel, analiza občutljivosti rešitve),
- celoštevilsko programiranje,
- osnove teorije grafov (pretvorba problemov pretovora, razvrščanja, maksimalnega pretoka, ipd. na linearne optimizacijske probleme),
- DEA (Data Envelopment Analysis) analiza,

Content (syllabus outline):

- Systems of linear equations and inequations (revision of solving linear equations using Gauss elimination method and matrix equations, solving systems of linear inequations using the graphic method),
- convex sets and determining extreme points,
- linear programming (problem formulation, solving problems using graphical method, solving problems using LINGO and Microsoft Excel software, sensitivity analysis of the solution);
- integer linear programming,
- basics of graph theory (transforming transshipment, assignment, maximum flow, etc. to linear optimization problems),
- DEA (Data Envelopment Analysis),
- AHP (Analytical Hierarchy Process) method.

- AHP (Analytical Hierarchy Process) metoda.

Temeljni literatura in viri / Reading materials:

E-gradivo predmeta.

Kramberger, T.: Kvantitativne metode v logistiki, Fakulteta za logistiko, Celje, 2019.

KRAMBERGER, T.: Osnove modeliranja u logistici. Subotica: [Ekonomski fakultet], 2015. 290 str., ilustr. ISBN 978-86-84819-98-9. [COBISS.SI-ID 512672317].

Meško, I. Optimizacija poslovanja. Ekonomsko-poslovna fakulteta, Maribor, 1997.

Čižman, A.: Operacijske raziskave : teorija in uporaba v organizaciji, Kranj, Moderna organizacija, 2003.

Winston, W. L.: Operations Research; Applications and algorithms. Thomson Learning, Belmont, CA, 4th ed.

Waters. D.: Quantitative Methods for Business, Addison Wesley, Essex, 1997, ISBN: 0-201-403978, COBISS.SI-ID: 9076454.

Cilji in kompetence:

Študenti:

- spoznajo in se naučijo osnov upravljanja logističnih sistemov s pomočjo kvantitativnih metod,
- razumejo koncept operacijskih raziskav in razvijejo sposobnost reševanja problemov v logističnih sistemih z linearnim in celoštevilskim linearnim modelom,
- razvijejo sposobnost interpretacije dobljene rešitve,
- se naučijo na podlagi izbranega kriterija rešitev še izboljšati.

Objectives and competences:

Students:

- are familiarized with and study the basics for managing logistics systems using quantitative methods,
- understand the concept of operational research and develop problem solving skills in logistics systems using the linear and whole number linear model,
- develop the skills to interpret the gained results,
- learn how to improve the solution based on the chosen criteria.

Predvideni študijski rezultati:

Znanje in razumevanje:

Študenti

- se naučijo reševati sisteme linearnih neenačb na grafični način,
- se naučijo osnov linearnega programiranja,
- uporabijo linearno programiranje za reševanje osnovnih logističnih problemov,
- se naučijo uporabe programskega paketa LINGO in programa Microsoft Excel za reševanje linearnih programov,
- se naučijo koncepte celoštevilskega linearnega programiranja, ter znajo tudi nekaj izmed problemov teorije grafov pretvoriti na problem linearnega programiranja,
- se naučijo uporabljati DEA analizo in AHP metodo.

Prenosljive/ključne spretnosti in drugi atributi:

Študenti se usposobijo za uporabo teoretičnega znanja v praktičnih primerih, predvsem pri procesih, ki so jih spoznali pri predmetih Temelji logistike in oskrbovalnih verig, Management trajnostnih

Intended learning outcomes:

Knowledge and understanding:

Students:

- learn to solve systems of linear inequations using graphs,
- learn the basics of linear programming,
- learn to use linear programming to solve basic logistics problems,
- learn to use LINGO and Microsoft Excel software to solve linear programmes,
- learn to use concept of integer linear programming, and knows how to transform some of the graph theory problems to linear program problems,
- learn to use DEA and AHP method.

Transferable/Key Skills and other attributes:

Students learn to apply theoretical knowledge to practical examples, especially processes from the following modules: Fundamentals of logistics and supply chain, Management sustainable supply chain,

oskrbovalnih verig, Načela logističnih aktivnosti in Ekonomika v logistiki v prvem letniku.

Principles of logistics activities, Economics in logistics from year 1.

Metode poučevanja in učenja:

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 v okviru laboratorijskih vaj, 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).

Learning and teaching methods:

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).

Students enhance their theoretical knowledge and are able to apply it. Part of the seminar is in a classroom, part represents the laboratory work, and 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:
<ul style="list-style-type: none">▪ Pisni izpit.▪ E- predavanja in e-vaje.	80% 20%	<ul style="list-style-type: none">▪ Written examination.▪ E-lectures and e-courses.

Reference nosilca / Course coordinator'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. http://www.ilst.org/uploads/priority_constrained_chinese_postman_kramb.zer.pdf.
2. KRAMBERGER, Tomaž, ROSI, Bojan: Do managers have enough quality information for decision-making. *Organizacija (Kranj)*, sep.-okt. 2007, letn. 40, št. 5, str. 207-217.
3. 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](https://doi.org/10.1016/j.trd.2008.03.007).
4. KRAMBERGER, Tomaž, ŠTRUBELJ, Gregor, ŽEROVNIK, Janez: Chinese postman problem with priority nodes. *Fund. Computing Decis. Sci.*, 2009, vol. 34, no. 4, str. 233-264. <http://fcds.cs.put.poznan.pl/FCDS2/ArticleDetails.aspx?articleId=218>.
5. FOŠNER, Maja, KRAMBERGER, Tomaž: Logistics as a part of leisure and tourism industry. V: 15th Annual Conference European Council for Business Education, May 28-30, 2010, Lausanne, Switzerland. "Co-operation and competition - in the leisure and service industries" : proceedings of the 15th Annual Conference European Council for Business Education, May 28-30, 2010, Lausanne, Switzerland, (ECBE proceedings of the Annual Conference, 2010). Lausanne: European Council for Business Education: = ECBE, 2010, str. 70-78.