

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Ime predmeta:	UPRAVLJANJE LOGISTIČNIH SISTEMOV
Course title:	CONTROL OF LOGISTICS SYSTEMS

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

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

Univerzitetna koda predmeta / University course code:	DR
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Predavanja Lectures	Seminar Seminar	Vaje Tutorial			Klinične vaje Clinical training	Druge oblike študija Other forms of study	Samost. delo Individual work	ECTS
20		AV	LV	RV			160	6

Nosilec predmeta / Course coordinator:	DEJAN DRAGAN
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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):
<p>TEORIJA VODENJA SISTEMOV: Osnovni pojmi, modeli sistemov, deterministični in naključni sistemi, vodenje kot problem odločanja, optimalno vodenje na podlagi modela. Regulatorji naročil in sinhronizacija oskrbovalne verige za kompenzacijo učinka biča.</p> <p>MODELIRANJE IN SIMULACIJA LOGISTIČNIH SISTEMOV: Teorija modeliranja diskretnih procesov, simulacijski jeziki, uvod v Scilab, simulacija diskretnih procesov, simulacija naključnih logističnih procesov, Monte Carlo simulacija.</p> <p>UPORABA STATISTIČNIH MODELOV IN METOD PRI UPRAVLJANJU OSKRBOVALNIH VERIG, TRANSPORTU IN PROMETU: Uporaba multivariantne statistične analize, strukturnih in drugih statističnih modelov v logistiki, oskrbovalnih verigah, transportu in prometu, za</p>	<p>THEORY OF SYSTEM CONTROL: Ontology of system control, system models, deterministic and stochastic systems, control as decision making, optimal model-based control. Orders' Controllers and supply chain synchronization for the bullwhip effect compensation.</p> <p>MODELING AND SIMULATION OF LOGISTIC SYSTEMS: Theory of discrete systems modelling, simulation tools, introduction to Scilab, simulation of discrete systems, simulation of stochastic logistic processes, Monte carlo simulation.</p> <p>THE USE OF STATISTICAL MODELS AND METHODS FOR THE SUPPLY CHAIN MANAGEMENT, TRANSPORTATION AND TRAFFIC: The use of multivariate statistical analysis, structural equation and other statistical models in logistics, supply chain management, transportation and</p>

<p>potrebe povečanja učinkovitosti podjetij in varnosti v transportu in prometu. Statistični modeli za ocenjevanje zmanjšanja emisij zaradi optimizacije v transportu.</p> <p>METODE ZA UPRAVLJANJE Z LOGISTIČNIMI SISTEMI: Optimizacija transportnih in logističnih sistemov, razvrščanje opravil v logistiki, heuristični postopki in metaheuristike pri optimizaciji logističnih sistemov, teorija napovedovanja časovnih vrst, postopki modeliranja in vodenja distribucijskih mrež.</p> <p>PRIMERI UPRAVLJANJA LOGISTIČNIH SISTEMOV: Razporejanje distribucijskih centrov, primeri razvrščanja v logističnih sistemih, upravljanje zalog, napovedovanje povpraševanja po zalogah, modeliranje transporta v distribucijskih mrežah, optimizacija problemov množične strežbe.</p>	<p>traffic. The main emphasis is on increasing a companies' efficiency, as well as improving transportation and traffic safety.</p> <p>METHODS FOR CONTROL OF LOGISTICS SYSTEMS: Optimization of transportation and logistics systems, job scheduling in logistic systems, heuristic procedures and meta-heuristics for the optimization of logistic systems, theory of time-series forecasting, modeling and control of distribution networks.</p> <p>EXAMPLES OF LOGISTICS SYSTEMS CONTROL: Allocation of distribution centers, scheduling examples in logistic systems, inventory control, demand forecasting, modeling of transportation in distribution networks, optimization of the problems in the queueing theory.</p>
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Temeljni literatura in viri / Reading materials:

- 1 Box, Jenkins: Time Series Analysis: Forecasting and Control, Wiley, 4th edition, 2008.
- 2 Dragan D., Upravljanje logističnih sistemov, Fakulteta za logistiko, 2009.
- 3 Dragan, D., Jereb, B. Introduction to queuing models : working report. Celje: Faculty of logistics, 2013.
- 4 DRAGAN, Dejan. Statistika in uvod v regresijske modele v Matlabu pri optimizaciji logističnih procesov : učbenik. 1. izd. Celje: Fakulteta za logistiko, 2014. 1 spletni vir (1 datoteka PDF (801 str.)). <http://blend.fl.uni-mb.si/>. [COBISS.SI-ID 80939521]
- 5 DRAGAN, Dejan. Stohastični procesi v logistiki : visokošolski učbenik. Celje: Fakulteta za logistiko, 2013. 570 str., graf. prikazi. <http://blend.fl.uni-mb.si/>. [COBISS.SI-ID 512501565]
- 6 DRAGAN, Dejan. Optimizacija logističnih procesov : visokošolski učbenik. Celje: Fakulteta za logistiko, 2010. 1 optični disk (CD-ROM), barve. ISBN 978-961-6562-40-9. [COBISS.SI-ID 252279808]
- 7 DRAGAN, Dejan. Principi modeliranja v logistiki : visokošolski učbenik. Celje: Fakulteta za logistiko, 2010. 1 CD-ROM. [COBISS.SI-ID 512264509]
- 8 DRAGAN, Dejan. Statistični modeli multiple regresije s programskim orodjem Matlab : skripta. Celje: Fakulteta za logistiko, 2021. 1 spletni vir (1 datoteka PDF (166 str.)), ilustr. <https://studij.um.si/>. [COBISS.SI-ID 64165379]
- 9 DRAGAN, Dejan. Management and control of logistic systems : theory and case studies : doctoral course (updated version). 2. izd. Celje: Fakulteta za logistiko, 2020. 477 str., ilustr. <http://studij.um.si/>. [COBISS.SI-ID 513062717]
- 10 DRAGAN, Dejan, JURIČIĆ, Đani, VRANČIĆ, Damir, INTIHAR, Marko, OBLAK, Maks, PUŠENJAK, Rudi, FOŠNER, Maja, IVANUŠA, Teodora, ALMEDER, Christian, MULEJ, Matjaž. Models, methods, and applications in logistics, transport, supply chain management, and operations research : lecture notes (international course). Celje: Faculty of Logistics, 2020. [972] str., ilustr. <http://studij.um.si/>. [COBISS.SI-ID 27117827]
- 11 DRAGAN, Dejan. Modern optimization methods, models, metaheuristics, and their role in logistics and supply chains : material of the subject Modeling principles in logistics : graduate study. 1. izd. Celje: Fakulteta za logistiko, 2020. [115] str., ilustr. <http://studij.um.si/>. [COBISS.SI-ID 513119037]

Cilji in kompetence:

Cilji predmeta so:

- osvojiti in razumeti pojme in znanja s področja matematičnih modelov in metod pri upravljanju logističnih sistemih (ULS).

Objectives and competences:

The aims of this course are:

- to acquire and understand concepts and knowledge in the field of mathematical models and methods within the scope of management of logistics systems (MLS).

- pravilno identificirati probleme s tega področja in pridobiti znanja za konstrukcijo modelov in uporabo metod pri ULS.
- razumeti mehanizme delovanja metod in modelov pri ULS, ter jih znati pravilno uporabiti za reševanje problemov.
- pridobiti znanja pravilne klasifikacije različnih problemov in zmožnosti uporabe pravilnih in ustreznih metod in modelov pri ULS za dani problem.
- pridobiti razumevanje teoretičnih ozadij, nujno potrebnih za pravilno interpretacijo dobljenih rezultatov metod in modelov pri ULS in ocenitev njihove kakovosti.
- pridobiti razumevanje fizikalnih in matematičnih mehanizmov v ozadju obravnavanih problemov in procesov v okviru ULS.
- se naučiti pravilno ovrednotiti ustreznost in kvaliteto uporabljenih metod in modelov pri ULS, ter znati pravilno uporabiti ustrezne metrike za testiranje njihove veljavnosti.
- se naučiti pravilno interpretirati rezultate uporabljenih metod in modelov pri ULS ter pravilno podati sklepe na njihovi osnovi.

Kompetence, ki jih pridobijo študenti:

- osvojijo teoretično znanje na področju matematičnih modelov in metod pri ULS;
- poglobljeno razumejo matematične modele in metode pri ULS;
- spoznajo in razumejo metrike na področju matematičnih modelov in metod pri ULS;
- razumejo fizikalne in matematične mehanizme v ozadju matematičnih modelov in metod pri ULS;
- rešujejo kompleksne probleme v logističnih sistemih s pomočjo matematičnih modelov in metod pri ULS.

razumejo delovanje matematičnih modelov in metod pri ULS, koristno tako v okviru tega, kot tudi drugih sorodnih predmetov.

- correctly identify problems in this area and gain knowledge for the construction of models and the use of methods within the scope of MLS.
- understand the working mechanisms of methods and models within the scope of MLS, and be able to use them correctly to solve problems.
- to acquire knowledge of the correct classification of various problems and the ability to use the correct and appropriate methods and models within the scope of MLS for a given problem.
- to gain an understanding of the theoretical backgrounds necessary for the correct interpretation of the obtained results of methods and models within the scope of MLS and assessment of their quality.
- to gain an understanding of the physical and mathematical mechanisms behind the problems and processes discussed within the scope of MLS.
- learn to properly evaluate the adequacy and quality of the conducted methods and models within the scope of MLS, and to be able to correctly use the appropriate metrics to test their validity.
- learn to correctly interpret the results of the used methods and models within the scope of MLS and to correctly draw conclusions based on these methods and models.

Competences acquired by students:

- acquire theoretical knowledge in the field of mathematical models and methods within the scope of MLS;
- have an in-depth understanding of mathematical models and methods within the scope of MLS;
- get to know and understand metrics in the field of mathematical models and methods within the scope of MLS;
- understand the physical and mathematical mechanisms behind mathematical models and methods within the scope of MLS;
- solve complex problems in logistics systems using mathematical models and methods within the scope of MLS.

- understand the working principles of mathematical models and methods within the scope of MLS, useful both within this and other related subjects.

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent bo ob zaključku predmeta zmožen:

- obvladati raziskovalne metode, postopke in procese na področju kvantitativnih metod in modelov v okviru ULS.
- samostojno znanstveno raziskovati na področju kvantitativnih metod in modelov v okviru ULS.
- razumeti uporabo kvantitativnih metod in modelov v okviru ULS z možnostjo poglobljene analize problemov in systemskega razmišljanja na tem področju.
- zmožen ustvarjalnega sodelovanja pri reševanju problemov v logističnih okoljih.
- pridobiti splošna in specifična znanja na področju kvantitativnih metod in modelov v okviru ULS.
- razviti sposobnosti za integracijo različnih konceptov kvantitativnih metod in modelov v okviru ULS, ki vodijo k inovativnim rešitvam obravnavanih problemov.
- razviti zmožnosti kritičnega analiziranja kompleksnih znanj, konceptov, in pristopov k uporabi kvantitativnih metod in načrtovanju kvantitativnih modelov, ter oblikovanju ustreznih strategij.
- sposoben na inovativen način sintetizirati informacije s področja kvantitativnih metod in modelov v okviru ULS, ter prepoznati vrednosti znanja ali procesov z vidika predmeta in prakse.

Intended learning outcomes:

Knowledge and understanding:

The student will be able to:

- Master research methods, procedures, and processes in the field of quantitative methods and models within the scope of MLS.
- Able for independent scientific research work in the field of quantitative methods and models within the scope of MLS.
- understand the use of quantitative methods and models within the scope of MLS with the ability of in-depth problem analysis and systems thinking in this area.
- Able to cooperate creatively in solving problems in logistics environments.
- acquire general and specific knowledge in the field of quantitative methods and models within the scope of MLS.
- Develop the ability to integrate various concepts in the field of quantitative methods and models within the scope of MLS, which lead to innovative solutions to the problems addressed.
- develop the ability to critically analyze complex knowledge, concepts, approaches, and strategies related to quantitative methods and models of logistics systems.
- Able to synthesize information in the field of quantitative methods and models within the scope of MLS innovatively and recognize the value of knowledge or processes from the subject and practice perspective.

Metode poučevanja in učenja:

Pri predavanjih študent spozna teoretične vsebine predmeta, nato študent utrdi teoretično znanje in preko primerov pridobi razumevanje za reševanje zahtevnejših aplikativnih problemov.

Learning and teaching methods:

Lectures: Student is introduced to the theoretical part of the subject. Student is pointed to consolidate the theoretical part of the subject. Additionally, student is pointed to gain the understanding for the solving of more demanding application problems.

Načini ocenjevanja:

Delež (v %) /
Share (in %)

Assessment methods:

Poročilo o raziskovalnem delu izbrane UE.	70%	Report about conducted research work of the chosen learning unit.
Javna predstavitev poročila	30%	Public presentation of report.

Reference nosilca / Course coordinator's references:

1. DRAGAN, Dejan, KESHAVARZSALEH, Abolfazl, INTIHAR, Marko, POPOVIĆ, Vlado, KRAMBERGER, Tomaž. *Throughput forecasting of different types of cargo in the Adriatic Seaport Koper*. *Maritime policy & management*, ISSN 1464-5254. [Spletna izd.], 2021, vol. 48, iss. 1, 19-45 str., ilustr. <https://doi.org/10.1080/03088839.2020.1748242>, doi: 10.1080/03088839.2020.1748242. [COBISS.SI-ID 513118781], [JCR, SNIP, WoS do 11. 10. 2021: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.40, Scopus do 14. 9. 2021: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.40]

kategorija: 1A1 (Z, A'', A', A1/2); uvrstitev: Scopus (d), SSCI, Scopus, MBP; tip dela je verificiral OSICD točke: 24.72, št. avtorjev: 5

2. POPOVIĆ, Vlado, KILIBARDA, Milorad J., ANDREJIĆ, Milan, JEREB, Borut, DRAGAN, Dejan. *A new sustainable warehouse management approach for workforce and activities scheduling*. *Sustainability*, ISSN 2071-1050, 2021, vol. 13, iss. 4, str. [1]-19, ilustr. <https://doi.org/10.3390/su13042021>, doi: 10.3390/su13042021. [COBISS.SI-ID 53206787], [JCR, SNIP, WoS do 26. 10. 2021: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.20, Scopus do 11. 11. 2021: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.20]

kategorija: 1A2 (Z, A', A1/2); uvrstitev: Scopus (d), SCI, SSCI, Scopus, MBP; tip dela je verificiral OSICD točke: 19.87, št. avtorjev: 5

3. DRAGAN, Dejan, MULEJ, Matjaž. *Some consequences of socially irresponsible, un-systemic behavior in ports : a case*. *Systems research and behavioral science : the official journal of the International Federation for Systems Research*, ISSN 1092-7026, 2019, vol. 36, iss. 6, str. 799-807. <https://doi.org/10.1002/sres.2646>, <https://onlinelibrary.wiley.com/doi/pdf/10.1002/sres.2646>, doi: 10.1002/sres.2646. [COBISS.SI-ID 513043261], [JCR, SNIP, WoS do 9. 8. 2021: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.50, Scopus do 16. 3. 2021: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.50]

kategorija: 1A2 (Z, A', A1/2); uvrstitev: Scopus (d), SSCI, MBP; tip dela je verificiral OSICD točke: 44.07, št. avtorjev: 2