

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	STATISTIČNO MODELIRANJE V LOGISTIKI
Course title:	STATISTICAL MODELING IN LOGISTICS

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
LOGISTIKA SISTEMOV 1.stopnja		2.	4.
SYSTEM LOGISTICS 1 st degree		2.	4.

Vrsta predmeta / Course type: OBVEZNI

Univerzitetna koda predmeta / University course code: UN

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Laboratory work	Druge oblike študija Field work	Samost. delo Individ. work	ECTS
24 e-P 21 a-P		9 e-V 21 a-V			105	6

Nosilec predmeta / Lecturer: TOMAŽ KRAMBERGER

Jeziki / Predavanja / Lectures: SLOVENSKI / SLOVENE
 Languages: Vaje / Tutorial: SLOVENSKI / SLOVENE

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

Vsebina:

- Uvod. Osnovni pojmi statistike.
- Urejanje in prikazovanje statističnih podatkov.
- Relativna števila/statistične mere. Srednje vrednosti. Mere variabilnosti podatkov. Asimetrija in mere asimetrije. Sploščenost in mere sploščenosti. Mere koncentracije. Lorenzov grafikon.
- Časovne vrste, trend, določanje linearnega trenda, metoda najmanjših kvadratov.
- Slučajne spremenljivke. Porazdelitveni zakon. Porazdelitvena funkcija.
- Diskretne slučajne spremenljivke, zvezne slučajne spremenljivke.
- Posebne diskretne slučajne spremenljivke. Posebne zvezne slučajne spremenljivke.
- Funkcije slučajnih spremenljivk. Slučajni vzorci. Statistike.
- Aritmetična sredina vzorca, varianca vzorca, porazdelitev aritmetične sredine vzorca. Centralni limitni izrek.
- Statistično ocenjevanje. Cenilka. Ocenjevanje aritmetične sredine populacije.
- Testiranje hipotez. Pojem statistične hipoteze.
- Statistika testa hipoteze. Kritično območje testa. Postopek testiranja hipotez.

Content (Syllabus outline):

- Introduction. Basis of statistics.
- Editing and presenting statistical data.
- Relative numbers/statistical measures. Mean values. Measures of data variability. Asymmetry and asymmetry measures. Kurtosis and skewness. Concentration measures. Lorenz curve.
- Time series, trend, determining linear trend, least squares method.
- Random variables. Distribution law. Distribution function.
- Discrete random variables, continuous random variables.
- Special discrete random variables.
- Special continuous random variables.
- Functions of random variables. Random patterns. Statistics.
- Arithmetic mean of a sample, variance of a sample, distribution of the arithmetic mean of a sample. Central limit theorem.
- Statistical estimating. Estimator.
- Estimating the arithmetic mean of a population.
- Hypotheses testing. The term of statistical hypothesis. Hypothesis test statistics. Critical area of a test. Hypotheses testing process. Arithmetic media testing.

- Testiranje aritmetične sredine.
- Regresija. Enostranska normalna regresija. Enostranska, dvostranska odvisnost.

- Regression. Simple normal regression. One-tail and two-tail dependence.

Temeljna literatura in viri / Readings:

E-gradivo predmeta.

Tominc, P.: Statistika v prometu, Univerza v Mariboru, Fakulteta za gradbeništvo, Maribor, 2000.

Spiegel, M.: Schaum's outline of theory and problems of statistics, London, McGraw-Hill International, 1992.

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

Cilji in kompetence:

Študenti:

- spoznajo osnovne pojme in metode matematične statistike ter teorije slučajnih procesov,
- osvojijo statistični pristop k preučevanju množičnih pojavov, predvsem pojavov vezanih na področje logistike,
- se naučijo uporabe statističnih metod v analizi logističnih procesov in logističnih sistemov.

Objectives and competences:

Students:

- understand the basic concepts and methods of mathematical statistics and theory of random processes,
- acquire statistical approach to mass phenomena analysis, especially phenomena from the field of logistics,
- learn to apply statistical methods in analysis of logistics processes and logistics systems.

Predvideni študijski rezultati:

Znanje in razumevanje:

- študenti osvojijo osnovne pojme statistike,
- študenti osvojijo matematične osnove za statistično proučevanje pojavov v logističnih sistemih,
- študenti se naučijo uporabiti statistične metode za raziskovanje konkretnih logističnih problemov,
- študenti se naučijo razumevati in prepoznavati statistično-matematične povezave v logističnih sistemih,
- študenti se naučijo osnov linearne modeliranja.

Prenesljive/ključne spretnosti in drugi atributi:

Študenti se usposobijo za uporabo teoretičnega znanja v praktičnih primerih, predvsem pri predmetih upravljanje s človeškimi viri, management v logistiki, odličnost v logistiki.

Intended learning outcomes:

Knowledge and understanding:

- students are familiarised with basic terminology of statistics,
- students are familiarised with mathematical basics for statistical analysis of phenomena in logistics systems,
- students learn to apply statistical methods in analysis of concrete logistical problems,
- students learn to understand and recognise statistical-mathematical interconnection in logistics systems,
- students learn basis of linear modelling.

Transferable/key skills and other attributes:

Students gain the ability to apply theoretical knowledge in practical examples, especially in courses management of human resources, management in logistics and excellence in logistics.

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 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

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).

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

elektronskem učnem okolju).

electronic learning environment).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
<ul style="list-style-type: none">▪ Opravljene obveznosti e-predavanj in e-vaj so pogoj za pristop k izpitu.▪ Pisni izpit.▪ Seminarska naloga.	<ul style="list-style-type: none">▪ 70%▪ 30%	<ul style="list-style-type: none">▪ Successful completion of e-lectures and e-tutorials is a prerequisite for entering the exam.▪ Written examination.▪ Project work.

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. 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.
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.