

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. degree			

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:

Prerequisites:

Ni pogojev

None

Vsebina:

Content (Syllabus outline):

- 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.

- 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.

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

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

Temeljna literatura in viri / Readings:

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.

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 linearnega modeliranja.

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.

- 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.

- 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-predavanj (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).

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-seminars 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 %) / Weight (in %)	Assessment:
<ul style="list-style-type: none"> ▪ Pisni izpit, ▪ seminarska naloga. 	<ul style="list-style-type: none"> ▪ 70% ▪ 30% 	<ul style="list-style-type: none"> ▪ 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.jlst.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.