Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Statistika v izobraževanju**
Course title:	**Statistics in Education**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	**/**	3.	5.
Five-year master's degree program Subject Teacher	**/**		

Vrsta predmeta / Course type	Obvezni / Compulsory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30			15		45	3

Nosilec predmeta / Lecturer:	Niko TRATNIK

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovenian
	Vaje / Tutorial:	slovenski / Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Jih ni.	There are none.

Vsebina:

- Osnovni pojmi statistike: Statistična populacija in vzorec. Klasifikacija statističnih spremenljivk. Urejanje statističnih podatkov. Grafični in tabelarni prikazi statističnih podatkov.
- Opisna statistika. Populacijske in vzorčne mere osrednje tendence in njihove karakteristike. Vrstilne karakteristike. Mere razpršenosti.
- Korelacija in regresija: Povezanost statističnih spremenljivk. Mere korelacije in korelacijski koeficienti. Pogojno matematično upanje. Regresijska premica. Metoda najmanjših kvadratov. Pojasnjena in nepojasnjena varianca.
- Vzorčne porazdelitve: Osnovni izrek matematične statistike. Porazdelitveni zakoni pomembnih vzorčnih statistik.
- Ocenjevanje parametrov: Točkovne in intervalne ocene. Cenilke in njihove lastnosti. Interval zaupanja.
- Preskušanje statističnih hipotez: Ničelna in alternativna hipoteza. Testna statistika in njeno kritično območje.
  - Parametrični preizkusi značilnosti.
  - Neparametrični preizkusi značilnosti.
  - Testiranje neodvisnosti.

Content (Syllabus outline):

- Basic concepts of statistics: Statistical population and sample. Classification of statistical variables. Ordering statistical data. Graphical and tabular presentation of statistical data.
- Descriptive statistics: Population and sample measures of central tendency and their characteristics. Order statistics. Measures of variability.
- Correlation and regression. Relationships between statistical variables. Measures of correlation and correlation coefficients. Conditional mathematical expectation. The regression line. Method of least squares. Explained and unexplained variance.
- Sampling Distributions: The basic theorem of mathematical statistics. Distribution functions of some important sampling statistics.
- Estimation of parameters: Point estimations and confidence intervals. Estimators and their properties. Confidence interval.
- Testing statistical hypothesis: Null hypothesis and alternative hypotheses. Test statistics and its critical region.
  - Parameters hypotheses testing.
  - Nonparameters hypotheses testing.
  - Testing the independence.

Temeljni literatura in viri / Readings:

1. Andy Field: *Discovering Statistics Using SPSS*, SAGE Publications, 2005.
2. M. Hladnik: *Verjetnost in statistika*, Fakulteta za računalništvo in informatiko, 2002.
3. R. Jamnik: *Matematična statistika*, DZS, 1980.
4. R. Jamnik: *Verjetnostni račun in statistika*, DMFA, 1995.
5. B. Kožuh, J. Vogrinc, *Obdelava podatkov*, FF UL, Ljubljana, 2009.
6. J. Sagadin: *Statistične metode za pedagoge*, Obzorja, 2003.

Cilji in kompetence:

Glavni cilj predmeta je proučiti najpomembnejše koncepte, metode in rezultate statistike.

Objectives and competences:

The main goal of the course is to study the fundamental concepts, methods and results of statistics.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumevanje in poznavanje osnovnih pojmov in klasičnih metod statistične analize podatkov.
- Razumevanje in pravilna uporaba različnih statističnih testov.

Intended learning outcomes:

Knowledge and understanding:

- Understanding and knowledge of the basic concepts and classical methods of statistical data analysis.

• Obvladanje ustrezne programske opreme za namene statističnega raziskovanja.	• Understanding and correct application of different statistical tests. • Knowledge of using appropriate software for statistical research.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje • Individualno delo	• Lectures • Laboratory exercises • Individual work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): <u>Izpit:</u> Pisni izpit – problemi Pisni izpit – teorija Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Pisni izpit – problemi se lahko nadomesti z dvema delnima testoma (sprotni obveznosti). Pisni izpit – teorija se lahko nadomesti z dvema delnima testoma (sprotni obveznosti).	 50% 50%	Type (examination, oral, coursework, project): <u>Exam:</u> Written exam – problems Written exam – theory Each of the mentioned assessments must be assessed with a passing grade. Passing grade of written exam – problems is required to take the written exam – theory. Written exam – problems can be replaced with two mid-term tests.

Reference nosilca / Lecturer's references:

1. KNOR, Martin, TRATNIK, Niko. A method for computing the edge-Hosoya polynomial with application to phenylenes. *Match : communications in mathematical and in computer chemistry*, ISSN 0340-6253, 2023, vol. 89, no. 3, str. 605-629. https://match.pmf.kg.ac.rs/issues/m89n3/m89n3_605-629.html.

2. BREZOVNIK, Simon, DEHMER, Matthias, TRATNIK, Niko, ŽIGERT PLETERŠEK, Petra. Szeged and Mostar root-indices of graphs. *Applied mathematics and computation*, ISSN 0096-3003, 2023, vol. 442, article no. 127736, 11 str. https://www.sciencedirect.com/science/article/pii/S0096300322008049?via%3Dihub.

3. RADENKOVIĆ, Slavko, REDŽEPOVIĆ, Izudin, ĐORĐEVIĆ, Slađana, FURTULA, Boris, TRATNIK, Niko, ŽIGERT PLETERŠEK, Petra. Relating vibrational energy with Kekulé- and Clar-structure-based parameters. *International journal of quantum chemistry*, ISSN 0020-7608, 2022, vol. 122, iss. 7, str. 1-7. https://onlinelibrary.wiley.com/doi/10.1002/qua.26867.

4. BREZOVNIK, Simon, TRATNIK, Niko, ŽIGERT PLETERŠEK, Petra. Weighted Wiener indices of molecular graphs with application to alkenes and alkadienes. *Mathematics*, ISSN 2227-7390, 2021, vol. 9, iss. 2, str. 1-16. https://www.mdpi.com/2227-7390/9/2/153.

5. TRATNIK, Niko. Generalized cut method for computing the edge-Wiener index. *Discrete applied mathematics*, ISSN 0166-218X, 2020, vol. 282, str. 222-233. https://www.sciencedirect.com/science/article/abs/pii/S0166218X19305098.