



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	<b>Statistika</b>
<b>Course title:</b>	Statistics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika		3.	6.
Mathematics		3 <sup>rd</sup>	6 <sup>th</sup>

**Vrsta predmeta / Course type**

**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
45		15	30		90	6

**Nosilec predmeta / Lecturer:**

<b>Jeziki / Languages:</b>	<b>Predavanja / Lectures:</b>	SLOVENSKO/SLOVENE
	<b>Vaje / Tutorial:</b>	SLOVENSKO/SLOVENE

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

**Prerequisites:**

**Vsebina:**

- Osnovni pojmi statistike: Statistična populacija in vzorec. Klasifikacija statističnih spremenljivk. Grafični in tabelni prikazi statističnih podatkov.
- Opisna statistika: Populacijske in vzorčne mere osrednje tendence, vrstilne karakteristike in mere variabilnosti.
- Vzorčne porazdelitve: Osnovni izrek matematične statistike. Porazdelitveni zakoni pomembnih vzorčnih statistik.
- Ocenjevanje parametrov: Točkovne in intervalne ocene. Cenilke in njihove

**Content (Syllabus outline):**

- Basic concepts of statistics: Statistical population and sample. Classification of statistical variables. Graphical and tabular presentation of statistical data.
- Descriptive statistics: Population and sample measures of central tendency, order statistics and measures of variability.
- Sampling Distributions: The basic theorem of mathematical statistics. Distribution functions of some important sampling statistics.

<p>lastnosti. Metoda momentov. Metoda maksimalne zanesljivosti. Interval zaupanja.</p> <ul style="list-style-type: none"> <li>• Preskušanje statističnih hipotez: Ničelna in alternativna hipoteza. Testna statistika in njeno kritično območje. Parametrični preizkusi značilnosti. Neparametrični preizkusi značilnosti. Testiranje neodvisnosti.</li> <li>• Analiza variance: Analiza po enem faktorju.</li> <li>• Neparametrična primerjava treh ali več populacij.</li> <li>• Regresijska analiza: Linearni regresijski model. Metoda najmanjših kvadratov. Testiranje regresijskega modela.</li> </ul>	<ul style="list-style-type: none"> <li>• Estimation of parameters: Point estimations and confidence intervals. Estimators and their properties. Moment estimation method. Maximum likelihood method. Confidence interval.</li> <li>• Testing statistical hypothesis: Null hypothesis and alternative hypotheses. Test statistic and its critical region. Parameters hypotheses testing. Nonparameters hypotheses testing. Testing the independence.</li> <li>• Analysis of variance: One-way analysis of variance.</li> <li>• Nonparametric comparison of three or more populations.</li> <li>• Regression analysis: Linear regression model. Method of least squares. Testing linear regression model.</li> </ul>
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#### Temeljni literatura in viri / Readings:

1. F. Daly, D.J. Hand, C. Jones, D. Lunn, K. McConway: *Elements of statistics*, Addison-Wesley, 1995.
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. G. McPherson: *Applying and interpreting statistics*, Springer, 2nd edition, 2001.
6. J. A. Rice: *Mathematical statistics and data analysis*, Duxbury Press, 1995.

#### Cilji in kompetence:

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

#### Objectives and competences:

The main goal of the course is to study the fundamental concepts, methods and results of applied 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.
- Obvladanje ustrezne programske opreme za namene statističnega raziskovanja.

Prenosljive/ključne spretnosti in drugi atributi:

#### Intended learning outcomes:

Knowledge and Understanding:

- Understanding and knowledge of the basic concepts and classical methods of statistical data analysis.
- Understanding and correct application of different statistical tests.
- Knowledge of using an appropriate software for statistical research.

Transferable/Key Skills and other attributes:

<ul style="list-style-type: none"> <li>• Prenos znanja iz statistike na različna strokovna in znanstvena področja, kjer se uporabljajo statistične analize podatkov.</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge transfer of statistical methods into different areas dealing with data analysis.</li> </ul>												
<b>Metode poučevanja in učenja:</b>	<b>Learning and teaching methods:</b>												
<ul style="list-style-type: none"> <li>• Predavanja</li> <li>• Teoretične vaje</li> <li>• Laboratorijske vaje</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Theoretical exercises</li> <li>• Laboratory exercises</li> </ul>												
<b>Načini ocenjevanja:</b>	<b>Assessment:</b>												
<p>Način (pisni izpit, ustno izpraševanje, naloge)</p> <p><u>Izpit:</u>  Pisni izpit – problemi  Ustni izpit – teorija</p> <p>Pisni izpit – problemi se lahko nadomesti z dvema testoma (sprotni obveznosti).</p> <p>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.</p> <p>Opravljen pisni izpit – problemi je pogoj za pristop k ustnemu izpitu – teorija.</p>	<table border="1"> <thead> <tr> <th>Delež (v %) / Weight (in %)</th> <th>Type (examination, oral, coursework):</th> </tr> </thead> <tbody> <tr> <td>50%</td> <td><u>Exams:</u> Written exam – problems</td> </tr> <tr> <td>50%</td> <td>Oral exam – theory</td> </tr> <tr> <td></td> <td>Written exam – problems can be replaced with two mid-term tests.</td> </tr> <tr> <td></td> <td>Each of the mentioned commitments must be assessed with a passing grade.</td> </tr> <tr> <td></td> <td>Passing grade of written exam – problems is required to take the oral exam – theory.</td> </tr> </tbody> </table>	Delež (v %) / Weight (in %)	Type (examination, oral, coursework):	50%	<u>Exams:</u> Written exam – problems	50%	Oral exam – theory		Written exam – problems can be replaced with two mid-term tests.		Each of the mentioned commitments must be assessed with a passing grade.		Passing grade of written exam – problems is required to take the oral exam – theory.
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#### Reference nosilca / Lecturer's references:

1. ČELOFIGA, Andreja, KORES-PLESNIČAR, Blanka, KOPRIVŠEK, Jure, MOŠKON, Miha, BENKOVIČ, Dominik, GREGORIČ KUMPERŠČAK, Hojka. Effectiveness of de-escalation in reducing aggression and coercion in acute psychiatric units : a cluster randomized study. *Frontiers in psychiatry*. Apr. 2022, vol. 13, str. 1-14, ilustr. ISSN 1664-0640. <https://www.frontiersin.org/articles/10.3389/fpsy.2022.856153/full#fun1>, <https://doi.org/10.3389/fpsy.2022.856153>, DOI: [10.3389/fpsy.2022.856153](https://doi.org/10.3389/fpsy.2022.856153). [COBISS.SI-ID [104051971](https://www.cobiss.si/id/104051971)],
2. BENKOVIČ, Dominik. Lie  $\sigma$ -derivations of triangular algebras. *Linear and Multilinear Algebra*. 2022, vol. 70, iss. 15, str. 2966-2983. ISSN 0308-1087. <https://www.tandfonline.com/doi/full/10.1080/03081087.2020.1820431>, DOI: [10.1080/03081087.2020.1820431](https://doi.org/10.1080/03081087.2020.1820431). [COBISS.SI-ID [127110659](https://www.cobiss.si/id/127110659)],
3. BENKOVIČ, Dominik, GRAŠIČ, Mateja. Jordan  $\{g,h\}$ -derivations of unital algebras. *Operators and matrices*. 2022, vol. 16, no. 2, str. 415-428. ISSN 1846-3886. <http://oam.ele-math.com/16-32/Jordan-g,h-derivations-of-unital-algebras>, DOI: [10.7153/oam-2022-16-32](https://doi.org/10.7153/oam-2022-16-32). [COBISS.SI-ID [114972163](https://www.cobiss.si/id/114972163)],
4. BENKOVIČ, Dominik. Generalized Lie  $n$ -derivations of triangular algebras. *Communications in algebra*. 2019, vol. 47, iss. 12, str. 5294-5302. ISSN 0092-

7872. <https://doi.org/10.1080/00927872.2019.1617875>, DOI: [10.1080/00927872.2019.1617875](https://doi.org/10.1080/00927872.2019.1617875). [COBISS.SI-ID [18879833](https://doi.org/10.1080/00927872.2019.1617875)],

5. BENKOVIČ, Dominik, GRAŠIČ, Mateja. Generalized skew derivations on triangular algebras determined by action on zero products. *Communications in algebra*. 2018, vol. 46, iss. 5, str. 1859-1867. ISSN 0092-7872. <https://doi.org/10.1080/00927872.2017.1360334>, DOI: [10.1080/00927872.2017.1360334](https://doi.org/10.1080/00927872.2017.1360334). [COBISS.SI-ID [18505817](https://doi.org/10.1080/00927872.2017.1360334)].