



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: Izbrana poglavja iz verjetnosti in statistike
Course title: Topics in Probability and Statistics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 3. stopnja		1. ali 2.	1. ali 3 ali 4.
Mathematics, 3 rd cycle		1 st or 2 nd	1 st or 3 rd or 4 th

Vrsta predmeta / Course type

izbirni/elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30					150	6

Nosilec predmeta / Lecturer:

Marko Jakovac

Jeziki /

Languages:

Predavanja/Lectures:

Vaje / Tutorial:

Slovenski jezik; Slovene

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

Poznanje temeljnih pojmov iz teorije verjetnosti in statistike

Prerequisites:

Knowledge of fundamental concepts in probability theory and statistics.

Vsebina:

Izbrana so posebna poglavja iz teorije verjetnosti (naključni procesi, časovne vrste) in statistike (univariatne in multivariatne statistične metode) ali katerega drugega raziskovalnega in uporabnega področja, kjer se uporabljata verjetnost in statistika. Izbira poglavij je odvisna od interesa in raziskovalne usmerjenosti študentov. Literatura, ki je navedena spodaj, služi le kot pregledna osnova in je nadgrajena z bolj specializiranimi teksti.

Content (Syllabus outline):

Special topics in probability theory (stochastic processes, time series) and statistics (univariate and multivariate statistics methods) or some other research and applied area of probability and statistics are chosen. The choice depends on students' interests and their research orientation. The literature below in principle serves only as a survey basis, and is combined with more specialized texts.

Temeljni literatura in viri / Readings:

- M. Bilodeau, D. Brenner, *Theory of Multivariate Statistics*, Springer Verlag, 1999.
- P. Bremaud, *Markov Chains: Gibbs fields, Monte Carlo simulations and queues (Corrected Edition)*, Springer Verlag, 2008.
- P. J. Brockwell, R. A. Davis, *Introduction to Time Series and Forecasting*, Springer Cham, 2016.
- R. Christensen, *Advanced Linear Modeling*, 2nd edition, Springer Cham, 2019.
- G. R. Grimmett, D. R. Stirzaker: *Probability and random processes, 3rd Edition*, Oxford University Press, 2001.
- G. McPearson, *Applying and Interpreting Statistics*, Springer Verlag, 2001.
- H. T. Nguyen, G. S. Rogers, *Fundamentals of Mathematical Statistics*, Springer Verlag, 1989.
- J. R. Norris, *Markov Chains*, Cambridge University Press, 2012.
- S. I. Resnick, *Adventures in Stochastic Processes*, Birkhäuser, Boston, 2013.
- N. Sarapa: *Teorija verjetnosti*, Školska knjiga, 2002.
- A. Sen, M. Srivastava, *Regression analysis: Theory, Methods, and Applications*, Springer Verlag, 1990.

Cilji in kompetence:

- študentom predstaviti sodobno in zanimivo področje, kar lahko služi kot uvod v raziskovalno delo;
- Doseči poglobljeno razumevanje teoretskih in metodoloških konceptov s področja verjetnosti in statistike
- Razviti sposobnost za samostojno reševanje najzahtevnejših problemov iz verjetnosti in statistike
- Zmožnost razvijanja kritične refleksije na področju verjetnosti in statistike.

Objectives and competences:

- to present a modern and interesting area, which can serve as an introduction to student's research work;
- To achieve a deeper understanding of theoretical and methodological concepts of probability and statistics
- To develop the ability for solving the most challenging problems in probability and statistics
- Ability to develop critical reflection in probability and statistics

Predvideni študijski rezultati:

Znanje in razumevanje:

- poglobljeno znanje iz izbranega področja verjetnosti in statistike;
- poglobljeno razumevanje obravnavanih metod.

Prenosljive/ključne spretnosti in drugi atributi:

- podlaga za raziskovalno delo na izbranem področju verjetnosti in statistike;
- prenos znanja iz verjetnosti in statistike na različna strokovna in znanstvena področja, kjer se uporabljajo statistične analize podatkov.

Intended learning outcomes:

Knowledge and understanding:

- a deeper knowledge of a selected topic of probability and statistics;
- a deeper understanding of methods treated in the course.

Transferable/Key Skills and other attributes:

- a basis for research in a selected topics of probability and statistics;
- knowledge transfer of statistical methods into different areas dealing with data analysis.

Metode poučevanja in učenja:

- predavanja;
- priprava seminarja;
- konzultacije;
- samostojni študij.

Learning and teaching methods:

- lectures;
- seminar work;
- consultations;
- self-study.

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

- seminarsko predavanje;
- domače naloge;
- ustni izpit.

Delež (v %) /

Weight (in %)

Assessment:

Type (examination, oral, coursework, project):

- seminar talk;
- homework;
- oral examination.

20 %

30 %

50 %

Reference nosilca / Lecturer's references:

1. JAKOVAC, Marko, OTACHI, Yota. On the security number of the Cartesian product of graphs.

Discrete applied mathematics. [Print ed.]. Dec. 2021, vol. 304, str. 119-128. DOI:

[10.1016/j.dam.2021.07.030](https://doi.org/10.1016/j.dam.2021.07.030). [COBISS.SI-ID [72524547](https://www.cobiss.si/id/72524547)],

kategorija: 1A3

2. BUJTÁS, Csilla, JAKOVAC, Marko. Relating the total domination number and the annihilation number of cactus graphs and block graphs. *Ars mathematica contemporanea*. [Tiskana izd.]. 2019,

vol. 16, no. 1, str. 183-202. DOI: [10.26493/1855-3974.1378.11d](https://doi.org/10.26493/1855-3974.1378.11d). [COBISS.SI-ID [24318728](https://www.cobiss.si/id/24318728)],

kategorija: 1A3

3. JAKOVAC, Marko. Relating the annihilation number and the 2-domination number of block graphs. *Discrete applied mathematics*. [Print ed.]. May 2019, vol. 260, str. 178-187. DOI:

[10.1016/j.dam.2019.01.020](https://doi.org/10.1016/j.dam.2019.01.020). [COBISS.SI-ID [24555272](https://www.cobiss.si/id/24555272)],

kategorija: 1A3

4. BREŠAR, Boštjan, JAKOVAC, Marko, ŠTESL, Daša. Indicated coloring game on Cartesian products of graphs. *Discrete applied mathematics*. [Print ed.]. Jan. 2021, vol. 289, str. 320-326. DOI:

[10.1016/j.dam.2020.11.007](https://doi.org/10.1016/j.dam.2020.11.007). [COBISS.SI-ID [41803267](https://www.cobiss.si/id/41803267)],

kategorija: 1A3

5. JAKOVAC, Marko, MESARIČ ŠTESL, Daša. On game chromatic vertex-critical graphs. *Bulletin of the Malaysian Mathematical Sciences Society*. Jan. 2023, vol. 46, iss. 1, str. 1-30, ilustr. ISSN 0126-

6705. <https://link.springer.com/article/10.1007/s40840-022-01418-6>, DOI: [10.1007/s40840-022-01418-6](https://doi.org/10.1007/s40840-022-01418-6). [COBISS.SI-ID [139148291](https://www.cobiss.si/id/139148291)], [JCR]

kategorija: 1A1