

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Napredna statistika
Course title:	Advanced statistics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Računalništvo in spletne tehnologije, magistrski študijski program	-	Prvi	Prvi
Computer Science and Web Technologies, Master's Study Programme	-	First	First

Vrsta predmeta / Course type

Obvezni / Obligatory

Univerzitetna koda predmeta / University course code:

2-RST-MAG-NS-2026-09-29

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	-	35	-	-	145	7

Nosilec predmeta / Lecturer:

izr. prof. dr. Nuša Erman

Jeziki / Languages:

Predavanja / Lectures:

Slovenski, angleški / Slovene, English

Vaje / Tutorial:

Slovenski, angleški / Slovene, English

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

Poznavanje osnov statistike.

Prerequisites:

Knowledge of basic statistics.

Vsebina:

Teorije verjetnosti in klasična statistika:

- klasična in statistična definicija verjetnosti,
- pravila verjetnosti,
- slučajne spremenljivke in njihove verjetnostne porazdelitve.

Uvod v klasično sklepno statistiko:

- vzorčenje,
- ocenjevanje parametrov,
- preizkušanje statističnih domnev,
- metoda največjega verjetja.

Content (Syllabus outline):

Probability theory and classical statistics:

- classical and statistical definition of probability,
- rules of probability,
- random variables and their probability distributions.

Introduction to classical statistical inference:

- sampling,
- parameter estimation,
- hypothesis testing,
- maximum likelihood estimation.

Osnove Baysove statistike:

- Bayesov izrek za točkovne verjetnosti,
- Bayesov teorem v verjetnostnih porazdelitvah.

Bayesovsko sklepanje:

- posteriorno povprečje,
- ostale Bayesove točkovne ocene,
- Bayesovi posteriorni intervali,
- uporaba posteriornih porazdelitev za testiranje statističnih domnev.

Statistično modeliranje:

- linearni regresijski modeli, posplošeni linearni modeli in hierarhični modeli,
- klasično proti Bayesovskemu ocenjevanju parametrov modelov,
- ocenjevanje prileganja modelov podatkom.

Uporaba sodobnih računalniških programov za napredno statistično analizo.

Basics of Bayesian statistics:

- Bayes' theorem for point probabilities,
- Bayes' theorem applied to probability distributions.

Bayesian inference:

- the posterior mean,
- other Bayesian point estimates,
- Bayesian posterior intervals,
- using the posterior distribution to test hypotheses.

Statistical modelling:

- linear regression models, generalized linear models and hierarchical models,
- classic vs. Bayesian parameter estimation,
- evaluating model fit.

Application of state-of-the-art software for applied statistical analysis.

Temeljni literatura in viri / Readings:

- Field, A. (2026). *Discovering Statistics Using R and RStudio* (2nd ed.). SAGE Publications.
- Johnson, A.A., Ott, M.Q., Dogucu, M. (2022). *Bayes Rules!: An Introduction to Applied Bayesian Modeling*. Boca Raton: CRC Press.
- Cowles, M.K. (2013): *Applied Bayesian Statistics*. New York: Springer.
- Gareth, J., Witten, D., Hastie, R., R. Tibshirani (2021). *An Introduction to Statistical Learning with Applications in R, 2nd edition*. New York: Springer.

Cilji in kompetence:

Učna enota prispeva k razvoju naslednjih splošnih in predmetno specifičnih kompetenc:

- poznavanje pomena kakovosti in prizadevanje za kakovost strokovnega dela skozi avtonomnost, samoiniciativnost, (samo)kritičnost, (samo)refleksivnost in (samo)evalviranje v strokovnem delu
- sposobnost fleksibilne uporabe znanja v praksi
- sposobnost pridobivanja, selekcije, ocenjevanja in umeščanja novih

Objectives and competences:

The instructional unit contributes to the development of the following general and subject-specific competences:

- familiarity with the importance of quality, striving to maintain the quality of professional work through practicing autonomous behaviour, showing initiative, as well as through (self-)criticism, (self-)reflection and (self-)evaluation
- ability to use the acquired knowledge in practice in a flexible manner

informacij in zmožnost interpretacije raziskovalnega problema; • uporaba metodoloških orodij – izvajanje, koordiniranje in organiziranje raziskav, uporaba raznih raziskovalnih metod in tehnik • poznavanje osnovnih in naprednih metod analize podatkov in poizvedovanja v podatkih • obvladanje raziskovalnih metod, postopkov in procesov • sposobnost izvedbe kvantitativne raziskave in analize podatkov z uporabo ustreznih statističnih metod in modelov s pomočjo primerne programske opreme	• the ability to obtain, select, evaluate and place new information and the ability to interpret the research problem; • use of methodological tools, i.e. implementation, coordination and organization of research, use of various research methods and techniques • familiarity with the basic and applied data analysis and data inquiry methods • competence in research methods, procedures and processes • ability to perform quantitative research and data analysis using appropriate statistical methods and models and suitable software
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Predvideni študijski rezultati:

Znanje in razumevanje:

Sposobnost študenta/študentke bo:

- v povezavi z drugimi predmeti bo poznal in razumel relevantna poglavja iz družboslovnega raziskovanja, podatkovnih baz in podatkovne analitike.
- sposoben zavzeti stališče do ključnih etičnih vprašanj v raziskovalnem procesu in kritično vrednotiti konkreten primer
- poznal in bil sposoben uporabiti izbrane metode in tehnike kvantitativnega raziskovanja na višjem nivoju
- sposoben uporabe osnovne programske opreme za kvantitativno analizo
- sposoben pripraviti in izvesti načrt kvantitativne raziskave: raziskovalno vprašanje, hipoteze, načrt zbiranja in obdelave podatkov, zbiranje in obdelava podatkov, diskusija o rezultatih
- sposoben refleksije in kritičnega vrednotenja primernosti določene raziskovalne metode za analizo konkretnega problema

Intended learning outcomes:

Knowledge and understanding:

The ability of the student:

- to realise and understand the relevant chapters from the research in social science, data bases and data analytics.
- to take a position on key ethical issues in the research process and to be critical in evaluating concrete examples;
- to apply methods and techniques of quantitative research on higher level;
- to use of basic software for quantitative analysis;
- to prepare and implement a quantitative research plan: research questions, hypotheses, data collection and processing plan, collection and processing of data, discussion about the results;
- reflection and critical evaluation of the appropriateness of certain research methods for the analysis of concrete problems

Metode poučevanja in učenja:

- *predavanja* z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov)
- *vaje*, kjer študentje na enostavnih primerih ponovijo temeljne koncepte in metode, predstavljene na predavanjih
- *laboratorijske vaje*, kjer se študenti seznanijo s programskimi orodji za zbiranje in analiziranje podatkov

Learning and teaching methods:

- *lectures* with active students participation (explanations, discussion, questions, examples, problem solving);
- *tutorials* (students will recall, reinforce, and shed light on the concepts and methods taught on lectures);
- *lab work* (students will learn state of the art software for data collection and analysis).

Načini ocenjevanja:

Delež (v %) /

Weight (in %)

Assessment:

Način:

- pisni izpit

100 %

Type:

written exam

Reference nosilca / Lecturer's references:

- ERMAN, Nuša, ROBIDA, Nika, ROJKO, Katarina. Differences among higher education students from the ICT field : formal education vs. lifelong learning. Journal of infrastructure, policy and development. 2025, vol. 9, iss. 1, [article no.] 10714, str. 1-20.
- ROJKO, Katarina, ERMAN, Nuša. The Impact of the Covid-19 Pandemic on Higher Education Students' Perceptions of Educational Applications and Platforms. International Journal of Cognitive Research in Science, Engineering and Education. 2023, vol. 11, no. 2, str. 267-279.
- ERMAN, Nuša, ROJKO, Katarina, LESJAK, Dušan. Traditional and new ICT spending and its impact on economy. Journal of computer information systems. 2022, vol. 62, iss. 2, str. 384-396.
- ROJKO, Katarina, LESJAK, Dušan, ERMAN, Nuša. The COVID-19 Pandemic Crisis : impact on ICT spending. Journal of computer information systems. 2022, vol. , iss. , str. 1-16.