

| UČNI NAČRT PREDMETA / COURSE SYLLABUS | | | | | | |
|--|---|--------------------------------------|------------------------------|------------------------------------|---|-------------|
| Predmet: | | Bayesova statistika | | | | |
| Course title: | | Bayesian statistics | | | | |
| Študijski program in stopnja Study programme and level | | Študijska smer Study field | | Letnik Academic year | Semester Semester | |
| Magistrski študijski program Matematika | | ni smeri | | 1 ali 2 | prvi ali drugi | |
| Master's study programme Mathematics | | none | | 1 or 2 | first or second | |
| Vrsta predmeta / Course type | | | | izbirni | | |
| Univerzitetna koda predmeta / University course code: | | | | M2518 | | |
| Predavanja Lectures | Seminar Seminar | Vaje Tutorial | Klinične vaje work | Druge oblike študija | Samost. delo Individ. work | ECTS |
| 30 | 15 | 30 | | | 105 | 6 |
| Nosilec predmeta / Lecturer: | | prof. Jaka Smrekar | | | | |
| Jeziki / Languages: | Predavanja / Lectures: | slovenski/Slovene, angleški/English | | | | |
| | Vaje / Tutorial: | slovenski/Slovene, angleški/English | | | | |
| Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti: | | | | Prerequisites: | | |
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| Vsebina: | | | | Content (Syllabus outline): | | |
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| <p>Bayesovi modeli z enim in več parametri. Povezava s standardnimi statističnimi metodami. Hierarhični modeli. Preverjanje modelov in analiza občutljivosti. Bayesovo načrtovanje poskusov.</p> <p>Bayesov pristop k združevanju rezultatov več raziskav, potenčne apriorne porazdelitve, analiza odvisnosti združene analize od preteklih raziskav.</p> <p>Uvod v regresijsko analizo. Analiza variance in kovariance, informativne hipoteze in njihovo ovrednotenje. Bayesov faktor, kompleksnost in prilaganje. Aposteriorne verjetnosti hipotez - modelov, vpliv apriorne porazdelitve, učni vzorec.</p> <p>Povzemanje aposteriorne porazdelitve, ocene parametrov, centralni kredibilnostni interval, pomen konjugiranih porazdelitev. Gibbov vzorčevalnik, konvergenca ocen, Metropolis Hastingsov algoritem. Aposteriorne simulacije. Drugi specifični modeli Bayesove analize.</p> | <p>Bayesian models with one and more parameters. Connection with standard statistical methods. Hierarchical models. Testing of models and sensitivity analysis. Bayesian design of experiment.</p> <p>Bayesian approach to evidence synthesis of multiple surveys, power priors, analysis of dependence of synthesis analysis on previous surveys.</p> <p>Introduction into regression analysis. Analysis of variance and covariance. Hypothesis testing via Bayes factor, complexity and fit. Posterior probabilities of hypotheses – models, and influence of priors on them, training sample.</p> <p>More on posterior probabilities, estimating parameters, central credibility interval, the importance of conjugated distributions. Gibbs sampler, convergence of estimates, algorithm Metropolis-Hastings. Posterior simulations. Some other specific models of Bayesian analysis.</p> |
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Temeljni literatura in viri / Readings:

A. Gelman, J.B.Carlin, H.S. Stern, D.B. Rubin: Bayesian Data Analysis. Chapman&Hall, 1995.

H. Hoijtink: Bayesian Data Analysis. In: R.E. Millsap and A. Maydeu-Olivares, The SAGE Handbook of Quantitative Methods in Psychology. London: SAGE, 2009.

I. Ntzoufras: Bayesian Modeling Using WinBUGS. New York: Wiley, 2009.

Cilji in kompetence:

Študent spozna temeljne Bayesove metode za obdelavo podatkov.

Spozna se tudi z uporabo teh metod v praksi. Zato je predvideno, da bodo pri predmetu sodelovali tudi strokovnjaki iz prakse.

Objectives and competences:

Basic knowledge of Bayesian statistics is acquired.

Bayesian methods are of great importance in practice. Therefore, experts with practical knowledge will present their experience in class.

Predvideni študijski rezultati:

Intended learning outcomes:

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| Znanje in razumevanje: Razumevanje osnovnih konceptov Bayesove statistike. | Knowledge and understanding: Understanding of basic concepts of Bayesian statistics. |
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Metode poučevanja in učenja:

predavanja, vaje, seminarske naloge, praktične naloge z uporabo statističnih paketov, konzultacije

Learning and teaching methods:

Lectures, exercises, seminar type homework, homework that require the use of statistical packages, consultations

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

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| Način (pisni izpit, ustno izpraševanje, naloge, projekt): Izpit iz vaj izpit iz teorije ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL) | 50% 50% | Type (examination, oral, coursework, project): 2 midterm exams instead of written exam, written exam oral exam Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL) |
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Reference nosilca / Lecturer's references:

Jaka Smrekar:

- SMREKAR, Jaka. Homotopy type of mapping spaces and existence of geometric exponents. Forum mathematicum, ISSN 0933-7741, 2010, vol. 22, no. 3, str. 433-456 [COBISS.SI-ID 15638105]
- SMREKAR, Jaka. Homotopy type of space of maps into a $K(G,n)$. Homology, homotopy, and applications, ISSN 1532-0073, 2013, vol. 15, no. 1, str. 137-149 [COBISS.SI-ID 16643929]
- SMREKAR, Jaka. Turning a self-map into a self-fibration. Topology and its Applications, ISSN 0166-8641. [Print ed.], 2014, vol. 167, str. 76-79 [COBISS.SI-ID 16943705]

