

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
<b>Predmet:</b>		Bayesova statistika				
<b>Course title:</b>		Bayesian statistics				
<b>Študijski program in stopnja</b> Study programme and level		<b>Študijska smer</b> Study field		<b>Letnik</b> Academic year	<b>Semester</b> Semester	
Magistrski študijski program Finančna matematika		ni smeri		1 ali 2	prvi ali drugi	
Master's study programme Financial Mathematics		none		1 or 2	first or second	
<b>Vrsta predmeta / Course type</b>				izbirni		
<b>Univerzitetna koda predmeta / University course code:</b>				M2518		
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike</b> študija	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
30	15	30			105	6
<b>Nosilec predmeta / Lecturer:</b>		prof. Jaka Smrekar				
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b> slovenski/Slovene, angleški/English				
		<b>Vaje / Tutorial:</b> slovenski/Slovene, angleški/English				
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		

<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-Hastingov 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:

<p>A. Gelman, J.B. Carlin, H.S. Stern, D.B. Rubin: Bayesian Data Analysis. Chapman &amp; Hall, 1995.</p> <p>H. Hoijtink: Bayesian Data Analysis. In: R.E. Millsap and A. Maydeu-Olivares, The SAGE Handbook of Quantitative Methods in Psychology. London: SAGE, 2009.</p> <p>I. Ntzoufras: Bayesian Modeling Using WinBUGS. New York: Wiley, 2009.</p>
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### Cilji in kompetence:

<p>Študent spozna temeljne Bayesove metode za obdelavo podatkov.</p> <p>Spozna se tudi z uporabo teh metod v praksi. Zato je predvideno, da bodo pri predmetu sodelovali tudi strokovnjaki iz prakse.</p>
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### Objectives and competences:

<p>Basic knowledge of Bayesian statistics is acquired.</p> <p>Bayesian methods are of great importance in practice. Therefore, experts with practical knowledge will present their experience in class.</p>
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### Predvideni študijski rezultati:

### Intended learning outcomes:

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

**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:**

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]

