

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)						
<b>Predmet:</b>		Verjetnost in statistika				
<b>Course title:</b>		Probability and 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	
Univerzitetni študijski program Finančna matematika		ni smeri		2	drugi	
First cycle academic study programme Financial Mathematics		none		2	second	
<b>Vrsta predmeta / Course type</b>				obvezni / compulsory		
<b>Univerzitetna koda predmeta / University course code:</b>				M0361		
<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>
45		45			90	6
<b>Nosilec predmeta / Lecturer:</b>		prof. dr. Mihael Perman, prof. dr. Jaka Smrekar				
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b>		slovenski / Slovene		
		<b>Vaje / Tutorial:</b>		slovenski / Slovene		
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
Vpis v letnik študija.				Enrolment in the programme.		
Opravljena predmeta Analiza 2 in Verjetnost 1.				Completed courses Analysis 2 and Probability 1.		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		

<p>Zvezne slučajne spremenljivke.</p> <p>Večrazsežne zvezne porazdelitve.</p> <p>Funkcije zveznih slučajnih vektorjev, transformacijska formula.</p> <p>Konvergenca porazdelitev, centralni limitni izrek, zakoni velikih števil.</p> <p>Opisne statistike in grafični prikazi podatkov.</p> <p>Pojem statističnega modela, parametri.</p> <p>Vzorčenje, vzorčni načrti, cenilke, vzorčna porazdelitev, standardna napaka, normalna aproksimacija, intervali zaupanja, stratificirano vzorčenje, kvocientna ocena.</p> <p>Ocenjevanje parametrov, cenilke, nepristranskost, metoda največjega verjetja, asimptotske lastnosti cenilk.</p> <p>Preizkušanje domnev, definicija problema, primeri, testne statistike, porazdelitve testnih statistik, velikost in moč testa, metoda razmerja verjetij.</p> <p>Regresija, definicija regresijskega modela, primeri, metoda najmanjših kvadratov, izrek Gauss-Markova, standardne napake in testi za regresijo, diagnostične metode.</p>	<p>Continuous random variables.</p> <p>Joint continuous distributions.</p> <p>Functions of continuous random vectors, transformation formula.</p> <p>Convergence of distributions, the central limit theorem, law of large numbers.</p> <p>Descriptive statistics and graphical presentation of the data.</p> <p>Statistical models, parameters.</p> <p>Sampling, sampling designs, estimators, sampling distribution, standard errors, normal approximation, confidence intervals, stratified sampling, ratio estimators.</p> <p>Parameter estimation, estimators, unbiased estimators, maximum likelihood, asymptotic properties of estimators.</p> <p>Hypothesis testing, statement of the problem, examples, test statistics, distribution of test statistics, size and power of the test, likelihood ratio test.</p> <p>Regression, regression model, least squares method, Gauss-Markov theorem, standard errors and hypothesis tests in regression, diagnostic methods.</p>
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**Temeljni literatura in viri / Readings:**

D. Stirzaker, Probability and Random Variables, A beginner's guide, Cambridge University Press, 1999.

G. Grimmett and D. Stirzaker, Probability and Random Processes, Third Edition, Oxford University Press, 1982.

J Rice, Mathematical Statistics & Data Analysis, Third Edition, Duxbury, 2007.

**Cilji in kompetence:**

Analiza in interpretacija podatkov je bistven del zadolžitev finančnih matematikov. Tečaj je namenjen predstavitvi osnovnih statističnih konceptov in modelov, ki največkrat nastopijo v statistični praksi.

**Objectives and competences:**

Analysing and interpreting data is an essential part of the work of a financial mathematician. The course presents statistical concepts and statistical models most commonly used in statistical practice

**Predvideni študijski rezultati:**

Poznavanje statističnega razmišljanja statističnih konceptov v obsegu, ki zadošča za samostojen nadaljni študij in samostojno uporabo statistike.

**Intended learning outcomes:**

Introduction of statistical concepts sufficient for independent study and the ability to present and analyze data with more advanced statistical models.

**Metode poučevanja in učenja:**

Predavanja, vaje, seminarska naloga.

**Learning and teaching methods:**

Lectures, problem sessions, seminar assignment.

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

**Assessment:**

2 kolokvija ali pisni izpit, ustni izpit.

75 %

2 midterms or written exam, oral exam.

Seminarska naloga.

25%

Seminar assignment.

Ocene: 1-5 (negativno), 6-10 (pozitivno)  
(po Statutu UL)

Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

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**Reference nosilca / Lecturer's references:**

PERMAN, Mihael. An excursion approach to Ray-Knight theorems for perturbed Brownian motion. Stochastic Processes and their Applications, ISSN 0304-4149. [Print ed.], 1996, let. 63, str. 67-74. [COBISS.SI-ID 7621465]

PERMAN, Mihael, WELLNER, Jon A. On the distribution of Brownian areas. Annals of applied probability, ISSN 1050-5164, 1996, let. 6, št. 4, str. 1091-1111. [COBISS.SI-ID 7101017]

PERMAN, Mihael, WELLNER, Jon A. An excursion approach to maxima of the Brownian bridge. Stochastic Processes and their Applications, ISSN 0304-4149. [Print ed.], 2014, vol. 124, iss. 9, str. 3106-3120. [COBISS.SI-ID 17154393]

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]

Jaka Smrekar:

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]

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]