UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)			
Predmet:	Statistika		
Course title:	Statistics		

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Enoviti magistrski študijski program Pedagoška matematika	ni smeri	3	drugi
Integrated Master's study programme Pedagogical Mathematics	none	3	second

Vrsta predmeta / Course type	obvezni / compulsory

Univerzitetna koda predmeta / University course code:	M0550

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike** **študija**	**Samost. delo** **Individ. work**	**ECTS**
30		30			90	5

Nosilec predmeta / Lecturer:	prof. dr. Mihael Perman, prof. dr. Jaka Smrekar

Jeziki / **Languages:**	**Predavanja /** **Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v letnik študija. Opravljeni predmeti Analiza 1, Analiza 2a in Analiza 2b.	Enrolment in the programme. Completed courses Analysis 1, Analysis 2a and Analysis 2b.
Vsebina:	**Content (Syllabus outline):**

Centralni limitni izrek.	Central limit theorem.
Vzorčenje: uvodni primeri, enostavno slučajno vzorčenje, vzorčna porazdelitev, standardna napaka in intervali zaupanja, stratificirano vzorčenje.	Sampling: introductory examples, simple random sampling, sampling distribution, standard error and confidence intervals, stratified sampling.
Ocenjevanje parametrov: pojem statističnega modela, cenilke, lastnosti cenilk, metoda največjega verjetja, asimptotične lastnosti cenilk.	Parameter estimation: statistical model, estimators, the properties of estimators, maximum-likelihood estimation, asymptotic properties of estimators.
Regresijski modeli: linearni regresijski modeli, cenilke, izrek Gauss-Markova, logistična regresija.	Regression models: linear regression model, estimators, the Gauss-Markov theorem, logistic regression.
Preizkušanje domnev: osnovne definicije in primeri, moč preizkusa, analiza variance, Wilksov izrek, neparametrični preizkusi.	Hypothesis testing: basic definitions and examples, the power of the test, variance analysis, Wilks' theorem, nonparametric tests.

Temeljni literatura in viri / Readings:

G. Grimmett, D. Welsh: Probability : An Introduction, Oxford Univ. Press, Oxford, 1986.

J. Pitman: Probability, Springer, New York, 1999.

D. Stirzaker: Probability and Random Variables : A Beginner's Guide, Cambridge Univ. Press, Cambridge, 1999.

R. Lupton: Statistics in Theory and Practice, Princeton Univ. Press, Princeton, 1993.

J. A. Rice: Mathematical Statistics and Data Analysis, 2nd edition, Duxbury Press, Belmont, 1995.

Cilji in kompetence:

Objectives and competences:

Na primeru vzorčenja vpeljemo osnovne pojme statistike kot so cenilka, vzorčna porazdelitev, standardna napaka in interval zaupanja. Sledi pojem statističnega modela in s tem povezanega ocenjevanja parametrov. Regresijski modeli različnih vrst so med najbolj pogostimi statističnimi modeli v uporabi. Zadnji del seznani študenta z osnovnimi pojmi in primeri preizkušanja domnev.	We introduce the basic concepts of statistics such as an estimator, sampling distribution, standard error and confidence interval. We continue with the concept of statistical model and parameter estimation. Regression models of various types are among the most common statistical models in applications. Finally, a student is acquainted with the basic concepts and examples of hypothesis testing.

Predvideni študijski rezultati:

Znanje in razumevanje: Statistika je po eni strani standardni del matematične izobrazbe, po drugi strani pa je izhodišče za uporabo v celi vrsti ved od biologije, ekonomije do finančne in aktuarske matematike. Postala je orodje v skoraj vsaki znanosti, kjer je potrebno analizirati kvantitativne podatke. Poznavanje osnovnih pojmov statistike je tako nujen del izobrazbe vsakega matematika.

Uporaba: Uporaba konceptov statistike sega na večino področij naravoslovnih znanosti in na številna družboslovna področja. Statistika je jezik ekonomije, nepogrešljiva pa je tudi v medicinskih raziskavah.

Refleksija: Razumevanje teoretičnih konceptov v številnih primerih uporabe.

Prenosljive spretnosti – niso vezane le na en predmet: Zmožnost razpoznavanja statističnih vsebin v drugih vedah (fizika, ekonomija, finance, aktuarstvo, medicina, biologija, industrijska statistika).

Intended learning outcomes:

Knowledge and understanding: Statistics is a standard part of mathematical education, and, on the other hand, the starting point for applications in a wide range of disciplines from biology, economics, financial and actuarial mathematics. It has become a tool in almost every science, where one has to analyze quantitative data. Knowledge of basic concepts of statistics is thus a necessary part of education of any mathematician.

Application: The use of concepts of statistics extends to many areas of science and social science. Statistics is the language of economics, and it is also indispensable in medical research.

Reflection: Understanding of theoretical concepts in many applications.

Transferable skills: The ability to identify the probability and statistical concepts in other sciences (physics, economics, finance, actuarial science, medicine, biology, industry statistics).

Metode poučevanja in učenja:

predavanja, vaje, domače naloge, konzultacije

Learning and teaching methods:

Lectures, exercises, homework, consultations

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Pisni izpit	50% 50%	Type (examination, oral, coursework, project): Written exam

Ustni izpit		Oral exam
ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)		Grading: 6-10 pass, 1-5 fail (according to the rules of University of Ljubljana)

Reference nosilca / Lecturer's references:

PERMAN, Mihael, WERNER, Wendelin. Perturbed Brownian motions. Probability theory and related fields, ISSN 0178-8051, 1997, let. 108, št. 3, str. 357-383. [COBISS.SI-ID 7848537]

HUZAK, Miljenko, PERMAN, Mihael, ŠIKIĆ, Hrvoje, VONDRAČEK, Zoran. Ruin probabilities and decompositions for general perturbed risk processes. Annals of applied probability, ISSN 1050-5164, 2004, vol. 14, no. 3, str. 1378-1397. [COBISS.SI-ID 13168985]

HUZAK, Miljenko, PERMAN, Mihael, ŠIKIĆ, Hrvoje, VONDRAČEK, Zoran. Ruin probabilities for competing claim processes. Journal of Applied Probability, ISSN 0021-9002, 2004, vol. 41, no. 3, str. 679-690. [COBISS.SI-ID 13207641]

SMREKAR, Jaka, YAMASHITA, Atsushi. Function spaces of CW homotopy type are Hilbert manifolds. Proceedings of the American Mathematical Society, ISSN 0002-9939, 2009, vol. 137, no. 2, str. 751-759. [COBISS.SI-ID 14965849]

SMREKAR, Jaka. Periodic homotopy and conjugacy idempotents. Proceedings of the American Mathematical Society, ISSN 0002-9939, 2007, vol. 135, no. 12, str. 4045-4055. [COBISS.SI-ID 14382681]

CENCELJ, Matija, DYDAK, Jerzy, SMREKAR, Jaka, VAVPETIČ, Aleš, VIRK, Žiga. Algebraic properties of quasi-finite complexes. Fundamenta mathematicae, ISSN 0016-2736, 2007, vol. 197, str. 67-80. [COBISS.SI-ID 14502233]