UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Aktuarska matematika
Course title:	Actuarial mathematics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester 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

Vrsta predmeta / Course type	izbirni

Univerzitetna koda predmeta / University course code:	M2516

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. Janez Bernik, prof. Mihael Perman

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:

Vsebina:	Content (Syllabus outline):

Modeliranje v zavarovalništvu:	Mathematical models for insurance:
porazdelitve izgub,	loss distribution,
izračun agregatnih izplačil,	methods to compute agregate payments,
modeliranje pogostnosti zahtevkov,	modeling of the claim frequencies,
rekurzivne metode za izračun agregatnih škod,	recursive methods for agregate loss computation,
teorija kredibilnosti,	credibility theory,
verjetnost bankrota,	probability of default,
modeli za odvisna tveganja,	dependent risks modeling,
modeli za ekstremne dogodke,	extreme events modeling,
stabilnost.	stability.

Temeljni literatura in viri / Readings:

H. H. Panjer, G. E. Willmot: Insurance Risk Models, Schaumburg, Society of Actuaries, 1992.

R. Kaas, M. Goovaerts, J. Dhaene, M Denuit: Modern Actuarial Risk Theory, Boston, Kluwer, 2001.

M. Denuit, J. Dhaene, M. Goovaerts, R. Kaas: Dependent Risks, Measures, Orders and Models, Wiley, 2005.

S. A. Klugman, H. H. Panjer, G. E. Willmot: Loss Models : From Data to Decisions, Wiley, 1998.

H. Bühlmann: Mathematical Methods in Risk Theory, Springer, 2005.

P. Embrechts, C. Klüppelberg, T. Mikosch: Modelling Extremal Events for Insurance and Finance, Springer, 1997.

Cilji in kompetence:	**Objectives and competences:**
Bolj kompleksni zavarovalni produkti zahtevajo bolj poglobljene matematične modele in bolj rafinirane mere tveganja. Tečaj bo prikazal ustaljene načine matematičnega razmišljanja v zavarovalništvu.	The complexity of the insurance products requires more and more sofisticated mathematical models and more refined measures of risk. The course will cover current mathematical modelling for insurance.
Zaradi nepostredne uporabnosti vsebin bodo pri predmetu sodelovali tudi strokovnjaki iz prakse.	Since the content is of great practical importance we expect that also specialists from financial practice will present their work

	experience during the course.

Predvideni študijski rezultati: / Intended learning outcomes:

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: Razumevanje pojma tveganja in merjenja tveganja je bistvenega pomena za vrednotenje in razvoj zavarovalnih produktov. Za oceno tveganja pa je potrebno razumevanje osnovnih stohastičnih modelov, ki jih uporabljajo aktuarji pri svojem delu. Uporaba: Pridobljeno znanje je neposredno uporabno v zavarovalnem sektorju.	Knowledge and understanding: Understanding of risks and its measuring is a central issue in pricing and development of modern insurance products. Knowledge of the basic stochastic models for insurance is needed to assess the risks involved. Application: The knowledge is directly applicable in insurance sector of the economy.
Refleksija: Medigra med uporabo, statističnim modeliranjem, povratno informacijo iz drugih ved in spodbude iz uporabe za matematično razmišljanje.	Reflection: Interoplay between applications, statistical modelling and feedback information from other fields. Mathematical thinking based on concrete applications.
Prenosljive spretnosti – niso vezane le na en predmet: Spretnosti so prenosljive na druga področja matematičnega modeliranja, še najbolj pa je predmet pomemben zaradi svoje neposredne uporabnosti.	Transferable skills: Skills are transferable to many other fields of mathematical modelling. The value of the course is in concrete applications to insurance.

Metode poučevanja in učenja: / Learning and teaching methods:

Metode poučevanja in učenja:	Learning and teaching methods:
predavanja, vaje, domače naloge, konzultacije	Lectures, exercises, homeworks, consultations

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):			Type (examination, oral, coursework, project):
izpit iz vaj (2 kolokvija ali pisni izpit)			2 midterm exams instead of written exam, written exam
ustni izpit			oral exam
Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)	50%	50%	Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

Janez Bernik:

– BERNIK, Janez, MASTNAK, Mitja, RADJAVI, Heydar. Realizing irreducible semigroups and real algebras of compact operators. Journal of mathematical analysis and applications, ISSN 0022-247X. [Print ed.], 2008, vol. 348, no. 2, str. 692-707. [COBISS.SI-ID 14899289]

– BERNIK, Janez, MASTNAK, Mitja, RADJAVI, Heydar. Positivity and matrix semigroups. Linear Algebra and its Applications, ISSN 0024-3795. [Print ed.], 2011, vol. 434, iss. 3, str. 801-812 [COBISS.SI-ID 15745625]

– BERNIK, Janez, MARCOUX, Laurent W., RADJAVI, Heydar. Spectral conditions and band reducibility of operators. Journal of the London Mathematical Society, ISSN 0024-6107, 2012, vol. 86, no. 1, str. 214-234. [COBISS.SI-ID 16357721]

Mihael Perman:

– 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]

– 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]