UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)			
Predmet:	Finančna matematika 3		
Course title:	Financial mathematics 3		

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 / elective

Univerzitetna koda predmeta / University course code: M2517

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. dr. Tomaž Košir, doc. dr. Dejan Velušček

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:
Vpis v letnik študija.	Enrolment in the programme.
Vsebina:	**Content (Syllabus outline):**

Osnove: obrestne mere, krivulje donosov, struktura obveznic, LIBOR obrestne mere.	Basic notions: interest rates, yield curves, bond structures, LIBOR rates.
Nekaj elemenatrnih modelov, kratkoročni modeli, pojem arbitraže v teh modelih, Vasičkov model, model Cox-Ingersoll-Ros, model Hull-White.	Some elementary models, short rate models, no-arbitrage in short rate models, Vasicek, Cox-Ingersoll-Ross, Hull-White models.
Modeli terminskih obrestnih mer v modelih z diskretnim in z zveznim časom. Klasični modeli, teorija Heatha. Jarrowa in Mortona (HJM), modeli terminskih obrestnih mer, ki jih ženejo slučajna polja.	Forward interest rate models in discrete and continuous time settings. Classical cases, Heath-Jarrow-Morton (HJM) framework and forward rate models driven by random fields.
Kriterij neobstoja arbitraže in pogoji usmeritve, zamenjava numerarja, martingalske metode.	No arbitrage criteria and drift conditions, change of numeraire, martingale methods.
Posebne teme: LIBOR modeli, obveznice in možnost propada, problemi vrednotenja izvedenih instrumentov na obrestne mere.	Some special topics: LIBOR models, defaultable bonds, pricing problems of certain interest rate derivatives.
Statistična vprašanja v modelih obrestnih mer: metode za kalibracijo modelov, ocenjevanje parametrov.	Statistical questions in interest rate models, calibration methods, parameter estimation.

Temeljni literatura in viri / Readings:

T. Bjork., Arbitrage Theory in Continuous Time, Oxford University Press, Oxford, New York, 1998.

D. Brigo, F. Mercurio. Interest Rate Models - Theory and Practice: With Smile, Inflation and Credit, Springer, Berlin, Heidelberg, New York, 2006.

R. A. Jarrow. Modeling Fixed Income Securities and Interest Rate Options, The McGraw-Hill Companies, Inc., New York, 1996.

M. Musiela, M. Rutkowski. Martingale Methods in Financial Modeling, Springer-Verlag, Berlin, Heidelberg, 1997.

A. Pelsser. Ecient Methods for Valuing Interest Rate Derivatives, Springer-Verlag, London, 2000.

Cilji in kompetence:	**Objectives and competences:**

Predmet pokriva poglavja iz matematičnih financ, ki so pomembna za modeliranje krivulj obrestnih mer.

Zaradi nepostredne uporabnosti vsebin bodo pri predmetu sodelovali tudi strokovnjaki iz prakse.

The course covers the chapter of mathematical finance that deal with modelling of the interest rate curves.

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:

Znanje in razumevanje:

Razumevanje matematičnih modelov, ki se uporabljajo v matematičnih financah, in sredstev za njihovo obravnavo.

Uporaba:

Pridobljeno znanje je po eni strani neposredno prenosljivo, po drugi strani pa je izhodišče za kombiniranje matematičnega znanja s finančnimi vsebinami.

Refleksija:

Področje, in s tem posledično predmet, združuje številne znanja iz matematike , predvsem tistih povezanih s teorijo verjetnosti in matematično statistiko.

Prenosljive spretnosti – niso vezane le na en predmet:

Pridobljeno znanje je neposredno uporabno v finančnih ustanovah kot so banke in investicijske družbe.

Intended learning outcomes:

Knowledge and understanding:

Understanding of mathematical models used in finance. Mathematical tools necessary in modelling.

Application:

The knowledge is directly usable in practice, it is also the source for combing of mathematical theories with finance.

Reflection:

The subject connects many mathematical topics, specially those of probablity theory and statistics, with application.

Transferable skills:

The knowledge is directly applicable in everyday practice in financial institutions such as banks and investment companies.

Metode poučevanja in učenja:

Learning and teaching methods:

predavanja, vaje, domače naloge, konzultacije, seminarske naloge	Lectures, exercises, homeworks, consultations, seminars

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): samostojna seminarska naloga ustni izpit Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)	 50% 50%	Type (examination, oral, coursework, project): seminar work oral exam Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

Tomaž Košir:

BERNIK, Janez, DRNOVŠEK, Roman, KOKOL-BUKOVŠEK, Damjana, KOŠIR, Tomaž, OMLADIČ, Matjaž, RADJAVI, Heydar. On semitransitive jordan algebras of matrices. Journal of algebra and its applications, ISSN 0219-4988, 2011, vol. 10, iss. 2, str. 319-333. [COBISS.SI-ID 15908697]

KOŠIR, Tomaž, OBLAK, Polona. On pairs of commuting nilpotent matrices. Transformation groups, ISSN 1083-4362, 2009, vol. 14, no. 1, str. 175-182. [COBISS.SI-ID 15077977]

BERNIK, Janez, DRNOVŠEK, Roman, KOŠIR, Tomaž, LIVSHITS, Leo, MASTNAK, Mitja, OMLADIČ, Matjaž, RADJAVI, Heydar. Approximate permutability of traces on semigroups of matrices. Operators and matrices, ISSN 1846-3886, 2007, vol. 1, no. 4, str. 455-467. [COBISS.SI-ID 14492761]

Dejan Velušček:

Dejan Velušček:

OSHIMA, Kojiro, TEICHMANN, Josef, VELUŠČEK, Dejan. A new extrapolation method for weak approximation schemes with applications. Annals of applied probability, ISSN 1050-5164, 2012, vol. 22, no. 3, str. 1008-1045. [COBISS.SI-ID 16384857]

KLEP, Igor, VELUŠČEK, Dejan. Central extensions of [star]-ordered skew fields. Manuscripta mathematica, ISSN 0025-2611, 2006, vol. 120, no. 4, str. 391-402. [COBISS.SI-ID 14074457]