UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)			
Predmet:	Izbrana poglavja iz računalniške matematike		
Course title:	Topics in mathematical foundations of computer science		
Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Doktorski študijski program Matematika in fizika	Matematika	1 ali 2	prvi ali drugi
Doctoral study programme Mathematics and Physics	Mathematics	1 or 2	first or second

Vrsta predmeta / Course type	izbirni / elective
Univerzitetna koda predmeta / University course code:	M3120

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike** **študija**	**Samost. delo** **Individ. work**	**ECTS**
30					**150**	**6**

Nosilec predmeta / Lecturer:	prof. dr. Andrej Bauer, prof. dr. Sergio Cabello Justo, prof. dr. Marko Petkovšek, prof. dr. Alexander Simpson

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):**

Izbrane bodo nekatere standardne teme iz podiplomske računalniške matematike, kot so: simbolno računanje, teorija izračunljivosti, računska geometrija, logika v računalništvu, teorija programskih jezikov, algoritmi in podatkovne strukture, kriptografija, analiza omrežij idr. Izbira je odvisna od interesov in raziskovalne usmeritve študentov.	The content consists of a selection of standard topics in graduate-level computational mathematics such as: symbolic computation, computability theory, computational geometry, logic in computer science, theory of programming languages, algorithms and data structures, cryptography, network analysis, etc. The choice depends on students' research interests.

Temeljni literatura in viri / Readings:

M. Petkovšek, H. S. Wilf, D. Zeilberger, A=B, Wellesley, Massachusetts, A K Peters, 1996.

J. Matoušek: Lectures on Discrete Geometry, Springer-Verlag, 2002.

T. H. Cormen, C. E. Leiserson, R. L. Rivest: Introduction to Algorithms, McGraw-Hill, 1990.

D. R. Stinson: Cryptography. Theory and practice, 3. izdaja, CRC Press, 2006.

B. C. Pierce: Types and Programming Languages, MIT Press, 2002.

M. Huth, Mark Ryan: Logic in Computer Science: Modelling and Reasoning about Systems, Cambridge University Press, 2000.

H. Rogers: Theory of Recursive Functions and Effective Computability, MIT Press, 1987.

P. Doreian, V. Batagelj, A. Ferligoj: Generalized Blockmodeling, Cambridge University Press, 2005.

S. Wasserman, K. Faust: Social Network Analysis: Methods and Applications, Cambridge University Press, 1994.

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

Namen predmeta je seznaniti študente z nekaterimi pomembnimi temami računalniške matematike.	The main goal of the course is to provide students with some important topics in computational mathematics.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje predstavljenih konceptov. Sposobnost uporabe pridobljenega znanja in spretnosti.	Knowledge and comprehension of presented concepts. Ability to use acquired knowledge and skills.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, konzultacije, reševanje problemov	Lectures, consultations, problem sessions

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit (domače naloge), ustni izpit		Writen exam (homeworks), oral exam
Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)	100 %	Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

BAUER, Andrej, CVETKO-VAH, Karin. Stone duality for skew Boolean algebras with intersections. Houston journal of mathematics, ISSN 0362-1588, 2013, vol. 39, no. 1, str. 73-109. [COBISS.SI-ID 16620377]

BAUER, Andrej, STONE, Christopher A. RZ: a tool for bringing constructive and computable mathematics closer to programming practice. Journal of logic and computation, ISSN 0955-792X, 2009, vol. 19, no. 1, str. 17-43. [COBISS.SI-ID 15325785]

AWODEY, Steve, BAUER, Andrej. Propositions as [Types]. Journal of logic and computation, ISSN 0955-792X, 2004, vol. 14, no. 4, str. 447-471. [COBISS.SI-ID 13374809]

BAUER, Andrej, PETKOVŠEK, Marko. Multibasic and mixed hypergeometric Gosper-type algorithms. Journal of symbolic computation, ISSN 0747-7171, 1999, let. 28, št. 4-5, str. 711-736. [COBISS.SI-ID 9210969]

PETKOVŠEK, Marko, ZAKRAJŠEK, Helena. Solving linear recurrence equations with polynomial coefficients. Preprint series, ISSN 2232-2094, 2013, vol. 51, no. 1185, str. 1-26. [COBISS.SI-ID 16571737]

KLAVŽAR, Sandi, MOLLARD, Michel, PETKOVŠEK, Marko. The degree sequence of Fibonacci and Lucas cubes. Discrete Mathematics, ISSN 0012-365X. [Print ed.], 2011, vol. 311, iss. 14, str. 1310-1322. [COBISS.SI-ID 15884121]

ABRAMOV, Sergei A., PETKOVŠEK, Marko. Polynomial ring automorphisms, rational (w, [sigma])-canonical forms, and the assignment problem. Journal of symbolic computation, ISSN 0747-7171, 2010, vol. 45, no. 6, str. 684-708. [COBISS.SI-ID 15580505]

CABELLO, Sergio, GIANNOPOULOS, Panos. The complexity of separating points in the plane. Algorithmica, ISSN 0178-4617, 2016, vol. 74, iss. 2, str. 643-663. [COBISS.SI-ID 17195097]

CABELLO, Sergio. Hardness of approximation for crossing number. Discrete & computational geometry, ISSN 0179-5376, 2013, vol. 49, iss. 2, str. 348-358. [COBISS.SI-ID 16340313]

CABELLO, Sergio. Many distances in planar graphs. Algorithmica, ISSN 0178-4617, 2012, vol. 62, no. 1-2, str. 361-381. [COBISS.SI-ID 15702873]

SIMPSON, Alex. A characterization of the least-fixed-point operator by dinaturality. Theoretical computer science, ISSN 0304-3975, 1993, vol. 118, iss. 2, str. 301-314. [COBISS.SI-ID 17181017]

SIMPSON, Alex. Computational adequacy for recursive types in models of intuitionistic set theory. Annals of pure and applied Logic, ISSN 0168-0072. [Print ed.], 2004, vol. 130, iss. 1-3, str. 207-275. [COBISS.SI-ID 17117017]

AWODEY, Steve, BUTZ, Carsten, SIMPSON, Alex, STREICHER, Thomas. Relating first-order set theories and elementary toposes. Bulletin of symbolic logic, ISSN 1079-8986, 2007, vol. 13, no. 3, str. 340-358. [COBISS.SI-ID 17096537]
Matija Pretnar:
BAUER, Andrej, PRETNAR, Matija. An effect system for algebraic effects and handlers. Logical methods in computer science, ISSN 1860-5974, 2014, vol. 10, iss. 4, paper 9 (str. 1-29). http://arxiv.org/pdf/1306.6316 [COBISS.SI-ID 17191001]

PRETNAR, Matija. Inferring algebraic effects. Logical methods in computer science, ISSN 1860-5974, 2014, vol. 10, iss. 3, paper 21 (str. 1-43) [COBISS.SI-ID 17190745]
PLOTKIN, Gordon, PRETNAR, Matija. Handling algebraic effects. Logical methods in computer science, ISSN 1860-5974, 2013, vol. 9, iss. 4, paper 23 (str. 1-36) [COBISS.SI-ID 16816729]