

UČNI NAČRT PREDMETA / COURSE SYLLABUS							
Predmet:		Logika v računalništvu					
Course title:		Logic in computer science					
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year		Semester Semester	
Interdisciplinarni magistrski študijski program Računalništvo in matematika		ni smeri		1 ali 2		prvi ali drugi	
Interdisciplinary Masters study programme Computer Science and Mathematics		none		1 or 2		first or second	
Vrsta predmeta / Course type				izbirni			
Univerzitetna koda predmeta / University course code:				M2839			
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS	
45		30			105	6	
Nosilec predmeta / Lecturer:				prof. Andrej Bauer			
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):			
Vsebina je razdeljena na obvezni del in na izbrana poglavja. Obvezni del:				The course is divided into core and optional parts. Core part:			

Sintaksa, formalni sistem, vezane spremenljivke, substitucija.	syntax, formal system, bound variables, substitution.
Lambda-račun in preprosti tipi.	Lambda-calculus and simple types.
Naravna dedukcija, izjavni račun, predikatni račun. Dokazni termini (proof terms).	Natural deduction, propositional and predicate calculus. Proof terms.
Izbrana poglavja:	Optional parts:
Curry-Howardova korespondenca	Curry-Howard correspondence
Konstruktivna interpretaciji logike, njen pomen za računalništvo.	Constructive interpretation of logic, and its significance for computer science.
Časovna logika in uporaba v računalništvu.	Temporal logic and its use in computer science.
Modalna logika in uporaba pri modeliranju znanja.	Modal logic and its use in knowledge modeling.
Ostali računi: pi-račun , dogodkovni račun ipd.	Other calculi: pi-calculus, event calculus, etc.
Dokazovalniki izrekov.	Automated theorem proving.

Temeljni literatura in viri / Readings:

M. Huth & M. Ryan: "Logic in computer science, 2nd Edition", Cambridge University Press, 2004.

Girard: "Proofs and Types", Cambridge University Press, 1989, ASIN: 0521371813.

D. Bridges & E. Bishop: "Constructive Analysis, 2nd ed.", Springer Verlag, 1985, ISBN: 0387150668, 477 str.

P. Martin-Lof: "An Intuitionistic Theory of Types". Twenty-Five Years of Constructive Type Theory. Editors: G. Sambin and J. Smith. Oxford Science Publications, 1998. Str. 127-172.

Cilji in kompetence:

Cilj predmeta je študente spoznati s povezavami med logiko in računalništvom, saj je logika na mnogih področjih računalništva nepogrešljivo orodje. Študent bo spoznal matematično ozadje iz področja logike, ki ga bo nato lahko učinkovito uporabljal pri reševanju računalniških nalog.

Objectives and competences:

The objective is to show students how logic and computer science are connected, as logic is an essential tool in many areas of computer science. Students will obtain basic mathematical and logical knowledge, which they will be able to use at solving computer-science tasks.

Predvideni študijski rezultati:

Znanje in razumevanje osnov matematične logike, predvsem v povezavi z računalništvom.

Intended learning outcomes:

Knowledge and understanding of basics of mathematical logic, especially in relation to computer science.

Metode poučevanja in učenja:

Predavanja, vaje, konzultacije.

Learning and teaching methods:

Lectures, tutorials and consultations.

Delež (v %) /

Weight (in %) **Assessment:**

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):
Sprotno preverjanje (domače naloge, kolokviji in projektno delo)
Končno preverjanje (pisni in ustni izpit)
Ocene: 6-10 pozitivno, 1-5 negativno
(v skladu s Statutom UL)

50%
50%

Type (examination, oral, coursework, project): Continuing (homework, midterm exams, project work) Final (written and oral exam)
Grading: 6-10 pass, 1-5 fail (according to the rules of University of Ljubljana)

Reference nosilca / Lecturer's references:

Andrej Bauer:

– HAJDINJAK, Melita, BAUER, Andrej. Similarity measures for relational databases. Informatica, ISSN 0350-5596, May 2009, vol. 33, no. 2, str. 143-149, ilustr [COBISS.SI-ID 7110996]

– BAUER, Andrej, STONE, Christopher A. RZ: a tool for bringing constructive and computable mathematics closer to programming practice. V: Computation and logic in the real world : Third Conference on Computability in Europe, CiE 2007, Siena, Italy, June 18-23, 2007 : proceedings, (Lecture notes in computer science, ISSN 0302-9743, 4497). Berlin, Heidelberg: Springer, cop. 2007, str. 28-42 [COBISS.SI-ID 14631769]

– AWODEY, Steve, BAUER, Andrej. Sheaf toposes for realizability. Archive for mathematical logic,

ISSN 0933-5846, 2008, vol. 47, no. 5, str. 465-478 [COBISS.SI-ID 15321689]

– BAUER, Andrej, TAYLOR, Paul. The Dedekind reals in abstract Stone duality. *Mathematical structures in computer science*, ISSN 0960-1295, 2009, vol. 19, iss. 4, str. 757-838 [COBISS.SI-ID 15322201]

– 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]

– BAUER, Andrej, KAVKLER, Iztok. A constructive theory of continuous domains suitable for implementation. V: *Joint Workshop Domains VIII - Computability over Continuous Data Types*, Novosibirsk, September 11-15, 2007, (*Annals of pure and applied logic*, ISSN 0168-0072, Vol. 159, iss. 3). Amsterdam: Elsevier, 2009, str. 251-267 [COBISS.SI-ID 15329625]