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: Sintaksa, formalni sistem, vezane spremenljivke, substitucija. Lambda-račun in preprosti tipi. Naravna dedukcija, izjavni račun, predikatni račun. Dokazni termi (proof terms). Izbrana poglavja: Curry-Howardova korespondenca Konstruktivna interpretaciji logike, njen pomen za računalništvo. Časovna logika in uporaba v računalništvu. Modalna logika in uporaba pri modeliranju znanja. Ostali računi: pi-račun , dogodkovni račun ipd. Dokazovalniki izrekov.	The course is divided into core and optional parts. Core part: syntax, formal system, bound variables, substitution. Lambda-calculus and simple types. Natural deduction, propostional and predicate calculus. Proof terms. Optional parts: Curry-Howard correspondence Constructive interpretation of logic, and its significance for computer science. Temporal logic and its use in computer science. Modal logic and its use in knowledge modeling. Other calcululi: pi-calculus, event calculus, etc. 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. Bsihop: "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:	**Objectives and competences:**

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.	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:

Intended learning outcomes:

Znanje in razumevanje osnov matematične logike, predvsem v povezavi z računalništvom.	Knowledge and understanding of basics of matehamatical logic, especially in relation to computer science.

Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja, vaje, konzultacije.	Lectures, tutorials and consultations.

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