

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)						
<b>Predmet:</b>		Logika v računalništvu				
<b>Course title:</b>		Logic in computer science				
<b>Študijski program in stopnja</b> Study programme and level		<b>Študijska smer</b> Study field		<b>Letnik</b> Academic year	<b>Semester</b> Semester	
Interdisciplinarni magistrski študijski program Računalništvo in matematika		ni smeri		1 ali 2	prvi ali drugi	
Interdisciplinary Master's study programme Computer Science and Mathematics		none		1 or 2	first or second	
<b>Vrsta predmeta / Course type</b>				izbirni / elective		
<b>Univerzitetna koda predmeta / University course code:</b>				M2839		
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike študija</b>	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
45		30			105	6
<b>Nosilec predmeta / Lecturer:</b>		prof. dr. Andrej Bauer				
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b> slovenski / Slovene, angleški / English				
		<b>Vaje / Tutorial:</b> slovenski / Slovene, angleški / English				
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
Vpis v letnik študija.				Enrolment in the programme.		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		

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

**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:**

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.

**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:**

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, 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]

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. *Journal of logic and computation*, ISSN 0955-792X, 2009, vol. 19, no. 1, str. 17-43. [COBISS.SI-ID 15325785]

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]