

| UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)                  |                           |  |                              |                                    |                                      |             |
|--|---------------------------|--|------------------------------|------------------------------------|--------------------------------------|-------------|
| <b>Predmet:</b>  |                           | Poučevanje algoritmičnega razmišljanja |                              |                                    |                                      |             |
| <b>Course title:</b>   |                           | Teaching algorithmic thinking          |                              |                                    |                                      |             |
| <b>Študijski program in stopnja</b><br>Study programme and level             |                           | <b>Študijska smer</b><br>Study field   |                              | <b>Letnik</b><br>Academic year     | <b>Semester</b><br>Semester          |             |
| Interdisciplinarni magistrski študijski program Računalništvo in matematika  |                           | ni smeri                               |                              | 1 ali 2                            | prvi                                 |             |
| Interdisciplinary Master's study programme Computer Science and Mathematics  |                           | none                                   |                              | 1 or 2                             | first                                |             |
| <b>Vrsta predmeta / Course type</b>  |                           |  |                              | izbirni / elective                 |                                      |             |
| <b>Univerzitetna koda predmeta / University course code:</b>                 |                           |  |                              | 63547                              |                                      |             |
| <b>Predavanja</b><br>Lectures  | <b>Seminar</b><br>Seminar | <b>Vaje</b><br>Tutorial                | <b>Klinične vaje</b><br>work | <b>Druge oblike študija</b>        | <b>Samost. delo</b><br>Individ. work | <b>ECTS</b> |
| 45   | 20                        | 10                                     |                              |                                    | 105                                  | 6           |
| <b>Nosilec predmeta / Lecturer:</b>  |                           | prof. dr. Janez Demšar                 |                              |                                    |                                      |             |
| <b>Jeziki / Languages:</b>   |                           | <b>Predavanja / Lectures:</b>          |                              | slovenski / Slovene                |                                      |             |
|  |                           | <b>Vaje / Tutorial:</b>                |                              | slovenski / Slovene                |                                      |             |
| <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> |                                      |             |

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| <p>Namen predmeta je izuriti prihodnje učitelje za poučevanje algoritmičnega razmišljanja. Didaktični pristop, ki ga bomo učili, temelji na načelih opisanih na <a href="http://csunplugged.org">http://csunplugged.org</a>. Primeri konkretnih tem, ki jih bomo jemali za zgled, v grobem sledijo IEEE/ACMovem kurikulumu za osnovne in srednje šole:</p> <p>binarna predstavitev podatkov, predstavitev slik in zvoka,</p> <p>stiskanje podatkov, teorija informacij, zaznavanje napak</p> <p>kriptografija,</p> <p>preiskovalni algoritmi, algoritmi za urejanje</p> <p>usmerjanje in smrti objem, končni avtomati in algoritmi na grafih</p> <p>in druge.</p> <p>Poleg konkretnih pristopov k poučevanju teh tem bodo študenti spoznavali predvsem splošna didaktična načela, ki jim je potrebno slediti pri poučevanju algoritmičnega razmišljanja.</p> <p>Študenti bodo poleg praktičnega dela v razredih na šolah, s katerimi so sklenjeni sporazumi o sodelovanju pod ustreznim mentorstvom nabirali praktične didaktične izkušnje tudi tako, da bodo pomagali pri izvedbi poletnih šol za dijake in osnovnošolce, vodili računalniške krožke, pripravljali osnovnošolce na tekmovanje Računalniški bober in podobno.</p> | <p>The goal of the course is to train the future teachers for teaching algorithmic thinking. The approach is based on principles described on <a href="http://csunplugged.org">http://csunplugged.org</a>. Concrete illustrations will roughly follow the list of topics proposed in the IEEE/ACM K12 curriculum for computer science:</p> <p>binary presentation of data, representation of images and sound,</p> <p>data compression, information theory, error detection,</p> <p>cryptography,</p> <p>searching algorithms, sorting algorithms,</p> <p>routing and deadlock, finite state automata, and algorithms on graphs,</p> <p>and others.</p> <p>Besides these concrete examples, students will learn about general didactical principles that need to be observed when teaching algorithmic thinking.</p> <p>In addition to practice classes in partner schools under appropriate supervision, the students will gain practical experience by helping in the summer schools at the faculty, by teaching computer groups at schools, preparing school children for the international Bebras competition etc.</p> |
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**Temeljni literatura in viri / Readings:**

O. Hazzan, T. Lapidot, N. Ragonis: Guide to Teaching Computer Science: An Activity-Based Approach, Springer, 2011.

T. Bell, I. H. Witten, M. Fellows: Computer Science Unplugged, [http://csunplugged.org/sites/default/files/activity\\_pdfs\\_full/CS\\_Unplugged-en-10.2006.pdf](http://csunplugged.org/sites/default/files/activity_pdfs_full/CS_Unplugged-en-10.2006.pdf), 2006.

R. Sedgewick, K. Wayne: Algorithms, 4th edition. Addison-Wesley, 2011.

**Cilji in kompetence:**

Slušatelji bodo na teoretičnem nivoju in prek praktičnih primerov osvojili primeren način za poučevanje algoritmičnega razmišljanja v osnovnih in srednjih šolah.

**Objectives and competences:**

Students will learn, both theoretically and through concrete examples, how to teach algorithmic thinking using methods that are appropriate for primary and high schools.

**Predvideni študijski rezultati:**

Študent bo znal posredovati osnovno- in srednješolcem intuitivno razumevanje delovanja različnih algoritmov.

**Intended learning outcomes:**

The student will be able to teach intuitive understanding of algorithms and data structure to children.

**Metode poučevanja in učenja:**

Predavanja in domače naloge. Poseben poudarek je na intuitivnem razumevanju snovi in na pridobivanju praktičnih pedagoških izkušenj.

**Learning and teaching methods:**

Lectures and homeworks with special emphasis on intuitive understanding and gaining practical experience.

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

50%

Type (examination, oral, coursework, project): Continuing (homework, practical work)

Sprotno preverjanje (domače naloge, praktično delo)

50%

Final (written exam)

Končno preverjanje (pisni izpit)

Grading: 6-10 pass, 1-5 fail (according to the rules of University of Ljubljana)

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| Ocene: 6-10 pozitivno, 1-5 negativno<br><br>(v skladu s Statutom UL) |  |  |
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**Reference nosilca / Lecturer's references:**

DEMŠAR, Janez. Algorithms for subsetting attribute values with Relief. Machine learning, ISSN 0885-6125. [Print ed.], Mar. 2010, vol. 78, no. 3, str. 421-428, graf. prikazi. [COBISS.SI-ID 7550548]

ŠTAJDOHAR, Miha, MRAMOR, Minca, ZUPAN, Blaž, DEMŠAR, Janez. FragViz : visualization of fragmented networks. BMC bioinformatics, ISSN 1471-2105, 2010, vol. 11, str. 1-14, ilustr. [COBISS.SI-ID 7964756]

ZUPAN, Blaž, DEMŠAR, Janez. Open-source tools for data mining. Clinics in laboratory medicine, ISSN 0272-2712, 2008, vol. 28, no. 1, str. 37-54, ilustr. [COBISS.SI-ID 6280532]

DEMŠAR, Janez, LEBAN, Gregor, ZUPAN, Blaž. FreeViz-An intelligent multivariate visualization approach to explorative analysis of biomedical data. Journal of biomedical informatics, ISSN 1532-0464, 2007, vol. 40, no. 6, str. 661-671, ilustr. [COBISS.SI-ID 6188116]

DEMŠAR, Janez. Statistical comparisons of classifiers over multiple data sets. Journal of machine learning research, ISSN 1532-4435. [Print ed.], Jan. 2006, vol. 7, str. [1]-30, graf. prikazi. [COBISS.SI-ID 5134420]