

| UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)                  |                           |   |                              |                                    |                                      |             |
|--|---------------------------|---|------------------------------|------------------------------------|--------------------------------------|-------------|
| <b>Predmet:</b>  |                           | Matematika z računalnikom   |                              |                                    |                                      |             |
| <b>Course title:</b>   |                           | Mathematics with computers  |                              |                                    |                                      |             |
| <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 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>                 |                           |   |                              | M2607                              |                                      |             |
| <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> |
| 15   | 30                        | 30  |                              |                                    | 105                                  | 6           |
| <b>Nosilec predmeta / Lecturer:</b>  |                           | prof. dr. Andrej Bauer, prof. dr. Marko Petkovšek                     |                              |                                    |                                      |             |
| <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> |                                      |             |

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| <p>Študent spozna programsko opremo za reševanje matematičnih problemov. Poudarek je predvsem na praktični uporabi in spoznavanju programske opreme. Predstavljena so naslednja področja (v oklepajih je predlagana programska oprema):</p> <p>analiza (Mathematica, Sage)</p> <p>diskretna matematika (Mathematica, Sage, Vega, Pajek)</p> <p>algebra (Mathematica, Sage, Magma, GAP)</p> <p>topologija in geometrija (Mathematica, Sage, GeoGebra, programska oprema za računanje topoloških invariant)</p> <p>statistika in finančna matematika (R)</p> <p>logika (Isabelle, Coq, HOL, Agda)</p> | <p>Students learn how to use software for solving mathematical problems. The course focuses on the practical aspects and proficient use of software. The following areas of computerized mathematics are covered (suggested software is listed in parentheses):</p> <p>analysis (Mathematica, Sage)</p> <p>discrete mathematics (Mathematica, Sage, Vega, Pajek)</p> <p>algebra (Mathematica, Sage, Magma, GAP)</p> <p>topology and geometry (Mathematica, Sage, GeoGebra, various specialized programs for topology invariants)</p> <p>statistics and financial mathematics (R)</p> <p>logic (Isabelle, Coq, HOL, Agda)</p> |
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**Temeljni literatura in viri / Readings:**

Uporabniški priročniki za programsko opremo.  
User manuals and other documentation for the software at hand.

**Cilji in kompetence:**

Spoznavanje in uporaba programske opreme za reševanje matematičnih problemov. V okviru seminarских/projektnih aktivnosti študentje z individualnim delom in predstavitvijo ter delom v skupinah pridobijo izobraževalno komunikacijske in socialne kompetence za prenos znanj in za vodenje (strokovnega skupinskega dela).

**Objectives and competences:**

Introduction to and application of specialized software for doing mathematics. With individual presentations and team work interactions within seminar/project activities students acquire communication and social competences for successful team work and knowledge transfer.

**Predvideni študijski rezultati:**

**Intended learning outcomes:**

Znanje in razumevanje: Praktično znanje iz uporabe zahtevnih pro- gramskih paketov za reševanje matematičnih problemov.

Uporaba: Uporaba računalnikov v matematiki.

Refleksija:

Moderna računalniška tehnologija je postala nepogrešljivo orodje za matematika.

Prenosljive spretnosti – niso vezane le na en predmet:

Predmet ima izrazito aplikativno naravnost in študentom omogoči uporabo sodobnih orodij pri ostalih študijskih predmetih.

Knowledge and understanding:

Practical knowledge and use of advanced programs for solving mathematical problems.

Application:

Application of computers in mathematics.

Reflection:

Modern computer technology has become an indispensable tool in mathematics.

Transferable skills:

The emphasis on practical use and applications enables the student to use computers in all other courses.

#### Metode poučevanja in učenja:

predavanja, vaje, projekti, domače naloge, konzultacije

#### Learning and teaching methods:

Lectures, exercises, project course, homeworks, consultations

#### Načini ocenjevanja:

Delež (v %) /

Weight (in %)

#### Assessment:

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

projektno delo

predstavitev in zagovor projekta

Ocene: 1-5 (negativno), 6-10 (pozitivno)  
(po Statutu UL)

50%

50%

Type (examination, oral, coursework, project):

course project

project presentation and defense

Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

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**Reference nosilca / Lecturer's references:**

Andrej Bauer:

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, CLARKE, Edmund, ZHAO, Xudong. Analytica - An experiment in combining theorem proving and symbolic computation. *Journal of automated reasoning*, ISSN 0168-7433, 1998, vol. 21, no. 3, str. 295-325. [COBISS.SI-ID 10606425]

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]

Marko Petkovšek:

PETKOVŠEK, Marko. Symbolic computation with sequences. *Programming and computer software*, ISSN 0361-7688, 2006, vol. 32, no. 2, str. 65-70. [COBISS.SI-ID 15287129]

PETKOVŠEK, Marko, WILF, Herbert S., ZEILBERGER, Doron. *A=B*. Wellesley (Massachusetts): A. K. Peters, cop. 1996. VII, 212 str. ISBN 1-56881-063-6. [COBISS.SI-ID 4085337] xii + 212 str. (ISBN 1-56881-063-6)

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]