



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

|                      |                             |
|----------------------|-----------------------------|
| <b>Predmet:</b>      | Uvod v matematiko           |
| <b>Course title:</b> | Introduction to Mathematics |

| Študijski program in stopnja<br>Study programme and level              | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|--|-------------------------------|-------------------------|----------------------|
| Enovit magistrski študijski program<br>druge stopnje Predmetni učitelj | /                             | 1.                      | 1.                   |
| Five-year master's degree program<br>Subject Teacher                   | /                             |                         |                      |

**Vrsta predmeta / Course type**

**Univerzitetna koda predmeta / University course code:**

| Predavanja<br>Lectures | Seminar<br>Seminar | Sem. vaje<br>Tutorial | Lab. vaje<br>Laboratory<br>work | Teren. vaje<br>Field work | Samost. delo<br>Individ. work | ECTS |
|------------------------|--------------------|-----------------------|---------------------------------|---------------------------|-------------------------------|------|
| 30                     |                    | 45                    |                                 |                           | 75                            | 5    |

**Nosilec predmeta / Lecturer:**

|                   |                               |                       |
|-------------------|-------------------------------|-----------------------|
| <b>Jeziki /</b>   | <b>Predavanja / Lectures:</b> | slovenski / Slovenian |
| <b>Languages:</b> | <b>Vaje / Tutorial:</b>       | slovenski / Slovenian |

|  |                       |
|--|-----------------------|
| <b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b> | <b>Prerequisites:</b> |
| Ni jih.  | None.                 |

**Vsebina:**  **Content (Syllabus outline):**

- Pojem izreka: izreki tipa “če-potem” in “če in samo če”, osnovne logične povezave, poimenovanje izrekov (lema, trditev, izrek, posledica). Pojem definicije v matematiki. Primeri dokazov na primerih iz elementarne matematike. Pojem protiprimera. Metode dokazovanja: direktna izpeljava, dokaz s protislovjem, dokaz z najmanjšim protiprimerom, matematična indukcija. Matematični poskusi. Heuristika.
- Realna števila. Ravninski koordinatni sistem. Elementarne funkcije: linearne, kvadratne, polinomi, racionalne, eksponentne, logaritemske, trigonometrične in njihovi inverzi.

- The concept of a theorem: “if-then” theorems, “if and only if theorems”, basic logic connections, naming theorems (lemma, proposition, theorem, corollary). The concept of a definition in mathematics. Examples of proofs from elementary mathematics. Proof methods: direct proofs, proof by contradiction, proof by smallest counterexample, mathematical inductions. Experiments in mathematics. Heuristics.
- Real numbers. Plane coordinate system. Elementary functions: linear, quadratic, polynomial, rational, exponential, logarithmic, trigonometric and their inverses.

### Temeljni literatura in viri / Readings:

G. Polya, Kako rešujemo matematične probleme, DMFA založništvo, Ljubljana, 1989

E. R. Scheinerman, Mathematics, A Discrete Introduction, Second Edition, Brooks/Cool, Pacific Grove, 2006

Ronald L. Graham, Donald E. Knuth, Oren Patashnik, Concrete mathematics : a foundation for computer science, Addison-Wesley, 1999

### Cilji in kompetence:

Spoznati osnovne principi matematičnega mišljenja in dela. Spoznati matematični formalizem in dokazovanje v matematiki ter načine kreativnega reševanja matematičnih problemov. Spoznati elementarne funkcije.

### Objectives and competences:

To know basic principles of mathematical thinking and work. To know mathematical formalism and methods of proofs in mathematics, as well as methods of creative solving of mathematical problems. To know elementary functions.

### Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumevanje temeljnih principov matematike.
- Dokazovanje preprostejših izrekov z različnimi metodami.
- Sposobnost za uporabo heurističnih metod.
- Sposobnost dela z elementarnimi funkcijami.
- Pridobljena znanja so osnova za vse druge matematične predmete.

### Intended learning outcomes:

Knowledge and understanding:

- Ability to understand basic principles of mathematics.
- Proving simpler theorems using different methods.
- Ability to use heuristic methods.
- Ability to work with elementary functions.
- The obtained knowledge forms a foundation for all other mathematical subjects.

### Metode poučevanja in učenja:

### Learning and teaching methods:

- Predavanja
- Seminarske vaje
- Individualno delo

- Lectures
- Tutorials
- Individual work

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

|   |                         |   |
|---|-------------------------|---|
| <p>Pisni izpit – problemi</p> <p>Ustni izpit – teorija</p> <p>Pisni izpit – problemi se lahko nadomesti z dvema delnima testoma (ki sta sprotni obveznosti).</p> <p>Tako pisni izpit – problemi kot ustni izpit – teorija morata biti opravljena s pozitivno oceno.</p> <p>Pozitivna ocena pri pisnem izpitu - problemi je pogoj za pristop k ustnemu izpitu – teorija.</p> | <p>50 %</p> <p>50 %</p> | <p>Written exam – problems</p> <p>Oral exam – theory</p> <p>Written exam – problems can be replaced with two mid-term tests.</p> <p>Both written exam - problems and oral exam - theory must be assessed with a passing grade.</p> <p>Passing grade of the written exam – problems is required for taking the oral exam – theory.</p> |
|---|-------------------------|---|

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

1. EREMITA, Daniel. Biderivations and commuting linear maps on current Lie algebras. *Journal of Lie theory*. 2021, vol. 31, no. 1, str. 119-126. ISSN 0949-5932. <http://www.heldermann.de/JLT/JLT31/JLT311/jlt31006.htm>. [COBISS.SI-ID 100444419]
2. EREMITA, Daniel. Biderivations on tensor products of algebras. *Communications in algebra*, ISSN 0092-7872, 2018, vol. 46, iss. 4, str. 1722-1726. <http://doi.org/10.1080/00927872.2017.1355375>, doi: 10.1080/00927872.2017.1355375.
3. EREMITA, Daniel. Behfar, Roonak (IR-UKURDS-M); Ghahramani, Hoger (IR-UKURDS-M): Lie maps on triangular algebras without assuming unity. (English summary). - *Mediterr. J. Math.* 18 (2021), no. 5, Paper No. 215, 28 pp. MathSciNet : Mathematical Reviews on the Web. [Spletna izd.]. 2022, 1 spletni vir (mr4309523). ISSN 2167-5163. <http://www.ams.org/mathscinet/pdf/MR4309523.pdf>. [COBISS.SI-ID 132959235]
4. EREMITA, Daniel. Jabeen, Aisha (6-JMI-SHU); Ahmad, Musheer (6-JMI-SHU): Multiplicative Lie triple derivation of triangular 3-matrix rings. (English summary). - *Ann. Univ. Ferrara Sez. VII Sci. Mat.* 67 (2021), no. 2, 293–308. MathSciNet : Mathematical Reviews on the Web. [Spletna izd.]. 2022, 1 spletni vir (mr4334719). ISSN 2167-5163. <http://www.ams.org/mathscinet/pdf/MR4334719.pdf>. [COBISS.SI-ID 132953347]

5. EREMITA, Daniel. Di Vincenzo, Onofrio M. (I-BASI-MIE); Nardoza, Vincenzo (I-BARI): Differential polynomial identities of upper triangular matrices under the action of the two-dimensional metabelian Lie algebra. (English summary). - *Algebr. Represent. Theory* 25 (2022), no. 1, 187–209. MathSciNet : Mathematical Reviews on the Web. [Spletna izd.]. 2022, 1 spletni vir (mr4368582). ISSN 2167-5163. <http://www.ams.org/mathscinet/pdf/MR4368582.pdf>. [COBISS.SI-ID 132949763]