



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

|                      |             |
|----------------------|-------------|
| <b>Predmet:</b>      | Matematika  |
| <b>Course title:</b> | Mathematics |

| Študijski program in stopnja<br>Study programme and level | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|-----------------------------------------------------------|-------------------------------|-------------------------|----------------------|
| Biologija                                                 |                               | 1.                      | 1.                   |
| Biology                                                   |                               | 1.                      | 1.                   |

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

| Predavanja<br>Lectures | Seminar<br>Seminar | Sem. vaje<br>Tutorial | Klinične vaje<br>work | Druge oblike<br>študija | Samost. delo<br>Individ.<br>work | ECTS |
|------------------------|--------------------|-----------------------|-----------------------|-------------------------|----------------------------------|------|
| 45                     |                    | 30                    |                       |                         | 105                              | 6    |

Nosilec predmeta / Lecturer:

Marko JAKOVAC

Jeziki /  
Languages:

Predavanja /  
Lectures:

SLOVENSKO/SLOVENE

Vaje / Tutorial:

SLOVENSKO/SLOVENE

**Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:**

Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno:

- računski izpit vsaj 50 %,
- teoretični izpit vsaj 30 %,
- skupna ocena računskega in teoretičnega izpita vsaj 50 %.

Pozitivna ocena pri računskem izpitu je pogoj za pristop k teoretičnemu izpitu.

**Prerequisites:**

Each of the listed obligations in the assessments must be completed with a positive grade:

- Calculation exam at least 50%,
- Theoretical exam at least 30%,
- Combined grade of the calculation and theoretical exam at least 50%.

Passing grade of the calculation exam is required for taking the theoretical exam.

**Vsebina:**

**Content (Syllabus outline):**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Osnove matematične logike. Temeljni matematični pojmi: definicija, izrek, dokaz. Množice. Preslikave.</li> <li>• Naravna in cela števila. Racionalna števila. Realna števila. Kompleksna števila.</li> <li>• Zaporedja. Limite in stekališča zaporedij. Številske vrste.</li> <li>• Funkcije realne spremenljivke. Limita in zveznost funkcije. Elementarne funkcije.</li> <li>• Odvod. Odvodi elementarnih funkcij. Izreki o srednji vrednosti. Višji odvodi. Lokalni ekstremi in prevoji. L'Hospitalovo pravilo.</li> <li>• Nedoločeni integral. Integracijske metode. Določeni integral. Riemannove vsote. Leibniz-Newtonova formula. Uporaba določenega integrala.</li> </ul> | <ul style="list-style-type: none"> <li>• Basics of mathematical logic. Fundamental mathematical notions: definition, theorem, proof. Sets. Mappings.</li> <li>• Integers. Rational numbers. Real numbers. Complex numbers.</li> <li>• Sequences. Limits and accumulation points. Series.</li> <li>• Real-valued functions of a single variable. Limits and continuity. Elementary functions.</li> <li>• The derivative. Derivatives of elementary functions. Mean value theorems. Higher derivations. L'Hospital rule.</li> <li>• The indefinite integral. Integration techniques. The definite integral. Riemann sums. The Leibniz-Newton formula. Applications of the definite integral.</li> </ul> |
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### Temeljni literatura in viri / Readings:

1. Šemrl, P. (2009). *Osnove višje matematike I* (Let. 45, str. 275). DMFA - založništvo.
2. Mizori-Oblak, P. (1994). *Matematika za študente tehnike in naravoslovja* (6. izd., str. 2 zv.). Fakulteta za strojništvo.
3. Pólya, G. (1989). *Kako rešujemo matematične probleme* ([3. natis], Let. 40, str. 272). Društvo matematikov, fizikov in astronomov SRS.
4. Lep, J. (1980). *Matematika I in II: z vajami in nalogami (v 2 zvezkih)* (str. 2 zv. (VI, 267 ; VIII, 268–650). Visoka tehniška šola.
5. Mramor Kosta, N., & Jurčič-Zlobec, B. (1991). *Matematika II, Zbirka nalog* ([5. izd.], str. 88). Fakulteta za elektrotehniko in računalništvo.
6. Wrede, R. C., & Spiegel, M. R. (2010). *Schaum's outlines advanced calculus* (3rd ed., str. IX, 445). McGraw Hill.

### Dodatna literatura / Additional readings:

1. Cedilnik, A., & Pavešić, P. (1998). *Zbirka rešenih nalog iz matematike* (str. 110). Biotehniška fakulteta, Oddelek za gozdarstvo.
2. Žerovnik, J., Banič, I., Hrastnik Ladinek, I., & Špacapan, S. (2009). *Zbirka rešenih nalog iz tehniške matematike* (3. popravljena in dopolnjena izd., str. 289, 31). Fakulteta za strojništvo.
3. Safier, F. (1998). *Schaum's outline of theory and problems of precalculus* (str. III, 407). McGraw-Hill.
4. Ayres, F., & Mendelson, E. (1999). *Schaum's outline of calculus* (4th ed., str. XI, 578). McGraw-Hill.

### Cilji in kompetence:

Spoznati temeljne matematične koncepte, osnove analize in osnove linearne algebre.

### Objectives and competences:

To know fundamental principles of mathematics, basics of calculus, and basics of linear algebra.

### Predvideni študijski rezultati:

### Intended learning outcomes:

|                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Znanje in razumevanje temeljnih matematičnih konceptov, osnovnih pojmov in rezultatov analize ter linearne algebre.</p> <p>Prenesljive/ključne spretnosti in drugi atributi:</p> <p>Pridobljena znanja so podlaga za večino predmetov s področja naravoslovja in matematike.</p> | <p>Knowledge and Understanding of fundamental principles of mathematics, basic notions and results of calculus and linear algebra.</p> <p>Transferable/Key Skills and other attributes:</p> <p>The obtained knowledge is a basis for most of the courses in the field of natural sciences and mathematics.</p> |
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#### Metode poučevanja in učenja:

|                                                                                           |
|-------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Predavanja</li> <li>• Seminarske vaje</li> </ul> |
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#### Learning and teaching methods:

|                                                                                            |
|--------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Lectures</li> <li>• Seminar excersises</li> </ul> |
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#### Načini ocenjevanja:

|                  |
|------------------|
| Računski izpit   |
| Teoretični izpit |

Delež (v %) /

Weight (in %)

#### Assessment:

|     |                  |
|-----|------------------|
| 60% | Calculation exam |
| 40% | Theoretical exam |

#### Opombe:

Računski izpit se lahko nadomesti s kolokviji.

#### Comments:

The calculation exam can be replaced by midterm exams.

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

1. BREŠAR, Boštjan, FERME, Jasmina, HOLUB, Přemysl, JAKOVAC, Marko, MELICHAROVÁ, Petra. S-packing colorings of distance graphs with distance sets of cardinality 2. Applied mathematics and computation. [Print ed.]. Apr. 2025, vol. 490, [article no.] 129200, 13 str. ISSN 0096-3003. <https://www.sciencedirect.com/science/article/pii/S0096300324006611>, DOI: [10.1016/j.amc.2024.129200](https://doi.org/10.1016/j.amc.2024.129200). [COBISS.SI-ID [216160771](https://www.cobiss.si/en/record/216160771)]
2. JAKOVAC, Marko, MESARIČ ŠTESL, Daša. On game chromatic vertex-critical graphs. *Bulletin of the Malaysian Mathematical Sciences Society*. Jan. 2023, vol. 46, iss. 1, str. 1-30, ilustr. ISSN 0126-6705. <https://link.springer.com/article/10.1007/s40840-022-01418-6>, DOI: [10.1007/s40840-022-01418-6](https://doi.org/10.1007/s40840-022-01418-6). [COBISS.SI-ID [139148291](https://www.cobiss.si/en/record/139148291)]
3. DRAVEC, Tanja, JAKOVAC, Marko, KOS, Tim, MARC, Tilen. On graphs with equal total domination and Grundy total domination numbers. *Aequationes mathematicae*. Feb. 2022, vol. 96, iss. 1, 137-146. ISSN 0001-9054. <https://link.springer.com/article/10.1007/s00010-021-00776-z>, DOI: [10.1007/s00010-021-00776-z](https://doi.org/10.1007/s00010-021-00776-z). [COBISS.SI-ID [100359427](https://www.cobiss.si/en/record/100359427)]
4. BUJTÁS, Csilla, JAKOVAC, Marko, TUZA, Zsolt. The  $k$ -path vertex cover: general bounds and chordal graphs. *Networks*. July 2022, vol. 80, iss. 1, str. 63-76. ISSN 0028-3045. <https://onlinelibrary.wiley.com/doi/10.1002/net.22079>, DOI: [10.1002/net.22079](https://doi.org/10.1002/net.22079). [COBISS.SI-ID [116964355](https://www.cobiss.si/en/record/116964355)]