



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Osnove analize
<b>Course title:</b>	Basic Analysis

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	1.	2.
Five-year master's degree program Subject Teacher	/		

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
60		30			60	5

Nosilec predmeta / Lecturer:

Jeziki /  
Languages: Predavanja /  
Lectures:   
Vaje / Tutorial:

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

Vsebina:  Content (Syllabus outline):

Realna števila; racionalna in iracionalna števila. Intervali. Supremum, maksimum. Absolutna vrednost. Kompleksna števila: osnovne lastnosti; polarni zapis.

Funkcije: limite; zveznost; monotone funkcije; zvezne funkcije na zaprtih intervalih, enakomerna zveznost; elementarne funkcije.

Osnovno o odvodih in njihovi uporabi.

Zaporedja: konvergenca, operacije z zaporedji; monotona zaporedja, število  $e$ ; podzaporedja, stekališča; Cauchyjeva zaporedja.

Vrste: konvergenca; vrste s pozitivnimi členi; absolutna in pogojna konvergenca; vsota in produkt vrst.

Real numbers; rational and irrational numbers. Intervals. Supremum, maximum. Absolute value. Complex numbers: basic properties; trigonometric form.

Functions: limits, continuity, monotone functions; functions continuous on a closed interval, uniform continuity; elementary functions.

Derivatives and their use.

Sequences: convergence, operations on sequences; monotone sequences, the number  $e$ ; subsequences, accumulation points; Cauchy sequences.

Series: convergence, series of positive terms; absolute and conditional convergence; addition and multiplication of series.

#### Temeljni literatura in viri / Readings:

- M. Dobovišek, M. Hladnik, M. Omladič, Rešene naloge iz analize I, DMFA - založništvo, Ljubljana, 2008
- F. Ayres, J., E. Mendelson: Schaum's Outline of Calculus, New York, McGraw-Hill, 1962 (Fourth Edition, 1999)
- I. Vidav, Višja matematika I, DZS, Ljubljana, 1974.
- R.C. Wrede, M.R. Spiegel, Schaum's outlines advanced calculus, McGraw Hill, 2010

#### Cilji in kompetence:

- Razumevanje osnovnih pojmov analize.
- Sposobnost reševanja nalog iz analize in z uporabo analize.

#### Objectives and competences:

- Understanding the basic concepts of analysis.
- Ability to solve problems from analysis and by use of analysis.

#### Predvideni študijski rezultati:

Znanje in razumevanje:

- Realnih in kompleksnih števil.
- Zaporedij in vrst.
- Limit, zveznosti in odvodov funkcij.

Pridobljena znanja so podlaga za večino predmetov v nadaljevanju študija.

#### Intended learning outcomes:

Knowledge and understanding:

- Real and complex numbers.
- Sequences and series.
- Limits, continuity and derivatives of functions.

The obtained knowledge is a basis for most of the later subjects.

**Metode poučevanja in učenja:**

<ul style="list-style-type: none"> <li>• Predavanja</li> <li>• Vaje</li> <li>• Individualno delo</li> </ul>
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**Learning and teaching methods:**

<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Tutorial</li> <li>• Individual work</li> </ul>
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Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Pisni izpit – problemi	50%	Written exam – problems
Ustni izpit – teorija	50%	Oral exam – theory

**Opombe:**

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

Positivna ocena pri pisnem izpitu – problemi je pogoj za pristop k ustnemu izpitu - teorija

Pisni izpit - problemi se lahko nadomesti s kolokviji v enakem deležu 50 %

**Comments:**

Each of the mentioned commitments must be assessed with a passing grade.

Passing grade of the written exam – problems is required for taking the oral exam – theory.

Written exam– problems can be replaced by written midterm examination in the weight of 50%.

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

<p>1. BREZOVNIK, Simon, CHE, Zhongyuan, TRATNIK, Niko, ŽIGERT PLETERŠEK, Petra. Outerplane bipartite graphs with isomorphic resonance graphs. <i>Discrete applied mathematics</i>. Jan. 2024, vol. 343, str. 340-349. ISSN 0166-218X. DOI: <a href="https://doi.org/10.1016/j.dam.2023.11.006">10.1016/j.dam.2023.11.006</a>. [COBISS.SI-ID 172545795]</p> <p>2. TRATNIK, Niko. Zhang-Zhang polynomials of phenylenes and benzenoid graphs. <i>Match : communications in mathematical and in computer chemistry</i>. 2024, vol. 92, no. 1, str. 25-53. ISSN 0340-6253. DOI: <a href="https://doi.org/10.46793/match.92-1.025T">10.46793/match.92-1.025T</a>. [COBISS.SI-ID 185502723]</p> <p>3. BREZOVNIK, Simon, DEHMER, Matthias, TRATNIK, Niko, ŽIGERT PLETERŠEK, Petra. Szeged and Mostar root-indices of graphs. <i>Applied mathematics and computation</i>. Apr. 2023, vol. 442, article no. 127736, 11 str. ISSN 0096-3003. DOI: <a href="https://doi.org/10.1016/j.amc.2022.127736">10.1016/j.amc.2022.127736</a>. [COBISS.SI-ID 139442179]</p> <p>4. TRATNIK, Niko, YE, Dong. Resonance graphs on perfect matchings of graphs on surfaces. <i>Graphs and combinatorics</i>. 2023, vol. 39, iss. 4, article no. 68, 15 str. ISSN 0911-0119. DOI: <a href="https://doi.org/10.1007/s00373-023-02666-4">10.1007/s00373-023-02666-4</a>. [COBISS.SI-ID 155893507]</p> <p>5. KNOR, Martin, TRATNIK, Niko. A method for computing the edge-Hosoya polynomial with application to phenylenes. <i>Match : communications in mathematical and in computer chemistry</i>. 2023, vol. 89, no. 3, str. 605-629. ISSN 0340-6253. DOI: <a href="https://doi.org/10.46793/match.89-3.605K">10.46793/match.89-3.605K</a>. [COBISS.SI-ID 142041603]</p>
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