



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	<b>Analiza I</b>
<b>Course title:</b>	Analysis I

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 1. stopnja		1.	2.
Mathematics, 1 <sup>st</sup> cycle		1.	2.

**Vrsta predmeta / Course type** obvezni/compulsory

**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
45		45			180	9

**Nosilec predmeta / Lecturer:** Iztok BANIČ

<b>Jeziki / Languages:</b>	<b>Predavanja / Lectures:</b>	SLOVENSKO/SLOVENIAN
	<b>Vaje / Tutorial:</b>	SLOVENSKO/SLOVENIAN

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

Jih ni.

**Prerequisites:**

There are none.

**Vsebina:**

Funkcije: osnovni pojmi; realne funkcije realne spremenljivke; elementarne funkcije; zveznost, enakomerna zveznost, zvezne funkcije na zaprtih intervalih; monotone funkcije; stekališča množice; limite.

Odvod: geometrijski pomen, pravila za odvajanje; odvodi elementarnih funkcij; izreki o srednji vrednosti, višji odvodi, Taylorjeva formula, lokalni ekstremi, L'Hospitalovo pravilo; konveksnost.

**Content (Syllabus outline):**

Functions: basic concepts; real functions of one real variable; elementary functions; continuity, uniform continuity, functions continuous on a closed interval; monotone functions; accumulation points of a set; limits.

Differentiation: geometric interpretation, differentiation formulas; derivatives of elementary functions; mean value theorems, higher derivatives, Taylor's formula, local extrema, L'Hospital rule; convexity.

**Temeljni literatura in viri / Readings:**

M. Dobovišek, M. Hladnik, M. Omladič, Rešene naloge iz analize, DMFA, Ljubljana, 1980.  
 E. Fischer, Intermediate real analysis, Springer, 1983.  
 J. M. Howie, Real analysis, Springer, 2001.  
 B. Hvala, Zbirka izpitnih nalog iz analize, DMFA, Ljubljana, 1996.  
 F. Morgan, , Real analysis, AMS, 2005.  
 M. A. Robdera, A concise approach to mathematical analysis, Springer, 2003.  
 W. Rudin, Principles of mathematical analysis, McGraw Hill Book Co., 1976.  
 I. Vidav, Višja matematika I, II, DZS, Ljubljana, 1974.

**Cilji in kompetence:**

Cilj in kompetence tega predmeta so, da študentje usvojijo osnovne pojme in metode realne analize, in jih uporabljajo pri nadaljnem študiju matematike.

**Objectives and competences:**

The objectives and competences of this course are for students to acquire basic knowledge of real analysis, and to apply it in the study of mathematics.

**Predvideni študijski rezultati:**

Znanje in razumevanje:

Po zaključku tega predmeta bo študent sposoben

- razumeti osnovne pojme realne analize.
- razložiti in uporabljati osnovne izreke realne analize (realne funkcije realne spremenljivke, zveznost in limita funkcije, odvod funkcije in njegova uporaba).
- za reševanje problemov uporabiti realno analizo.

Prenosljive/ključne spretnosti in drugi atributi:

- Spretnosti komuniciranja: ustni zagovor izpita, pisno izražanje pri pisnem izpitu.
- Uporaba informacijske tehnologije: uporaba računalna ali računalniških aplikacij pri reševanju problemov.
- Reševanje problemov: reševanje problemov s pomočjo metod iz realne analize.

**Intended learning outcomes:**

Knowledge and understanding:

On completion of this course the student will be able to

- understand basic concepts of real analysis.
- explain and use basic theorems from real analysis (real functions of real variable, continuity and limits of functions, differentiation and its applications),
- apply real analysis for problem solving.

Transferable/Key skills and other attributes:

- Communication skills: oral exam, manner of expression at written examination.
- Use of information technology: use of a calculator or computer applications for problem solving.
- Problem solving: problem solving using methods from real analysis

**Metode poučevanja in učenja:**

- Predavanja
- Teoretične vaje

**Learning and teaching methods:**

- Lectures
- Theoretical exercises

**Načini ocenjevanja:****Assessment:**

	Delež (v %) / Weight (in %)	
<p><u>Izpit:</u> Pisni izpit – problemi Ustni izpit – teorija</p> <p>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.</p> <p>Opravljen pisni izpit – problemi je pogoj za pristop k ustnemu izpitu – teorija.</p> <p>Pisni izpit – problemi se lahko nadomesti z dvema delnima testoma (sprotne obveznosti).</p>	<p>50%</p> <p>50%</p>	<p><u>Exam:</u> Written exam – problems Oral exam – theory</p> <p>Each of the mentioned assessments must be assessed with a passing grade.</p> <p>Passing grade of written exam – problems is required to take the oral exam – theory.</p> <p>Written exam – problems can be replaced with two mid-term tests.</p>

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

1. BANIČ, Iztok, ČREPNIJAK, Matevž, MERHAR, Matej, MILUTINOVIĆ, Uroš, SOVIČ, Tina. The closed subset theorem for inverse limits with upper semicontinuous bonding functions. Bulletin of the Malaysian Mathematical Society, ISSN 0126-6705, 2019, vol. 42, iss. 3, str. 835-846, doi: 10.1007/s40840-017-0517-5.
2. BANIČ, Iztok, GOODWIN, Simon, LOCKYER, Michael. Extending bonding functions in generalized inverse sequences. Topology and its Applications, ISSN 0166-8641. [Print ed.], March 2019, vol. 254, str. 85-100. <https://doi.org/10.1016/j.topol.2018.12.004>, doi: 10.1016/j.topol.2018.12.004.
3. BANIČ, Iztok, ČREPNIJAK, Matevž. Inverse component cropping sequences and connected inverse limits over intervals. Glasnik matematički. Serija 3, ISSN 0017-095X, 2018, vol. 53, no. 2, str. 371-384. [https://web.math.pmf.unizg.hr/glasnik/53.2/53\(2\)-09.pdf](https://web.math.pmf.unizg.hr/glasnik/53.2/53(2)-09.pdf), doi: 10.3336/gm.53.2.09.
4. BANIČ, Iztok, ČREPNIJAK, Matevž. Markov pairs, quasi Markov functions and inverse limits. Houston journal of mathematics, ISSN 0362-1588, 2018, vol. 44, no. 2, str. 695-707. [https://www.math.uh.edu/~hjm/restricted/pdf44\(2\)/16banic.pdf](https://www.math.uh.edu/~hjm/restricted/pdf44(2)/16banic.pdf).
5. BANIČ, Iztok, ČREPNIJAK, Matevž, MERHAR, Matej, MILUTINOVIĆ, Uroš. The (weak) full projection property for inverse limits with upper semicontinuous bonding functions. Mediterranean journal of mathematics, ISSN 1660-5446, Aug. 2018, vol. 15, iss. 4, str. 1-21, doi: 10.1007/s00009-018-1209-6.