



Univerza v Mariboru



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Fakulteta za naravoslovje in
matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Analiza III
Course title:	Analysis III

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika	Uporabna matematika	2.	4.
Mathematics	Applied Mathematics	2.	4.

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		60			210	11

Nosilec predmeta / Lecturer:

Bojan HVALA

Jeziki /

Languages:

Predavanja /

Lectures:

Vaje / Tutorial:

SLOVENSKO/SLOVENE

SLOVENSKO/SLOVENE

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

Opravljen izpit iz predmeta Linearna algebra

Prerequisites:

Exam from Linear Algebra.

Vsebina:

Metrični prostori. Odprte in zaprte množice. Zaporedja v metričnih prostorih. Polnost. Zveznost in enakomerna zveznost. Kompaktnost in povezanost.

Funkcije več realnih spremenljivk. Zveznost, parcialna odvedljivost. Višji parcialni odvodi. Taylorjeva formula. Lokalni in globalni ekstremini. Izrek o implicitni funkciji. Vezani ekstremini.

Content (Syllabus outline):

Metric spaces. Open and closed sets. Sequences in metric spaces. Complete metric spaces. Continuous and uniformly continuous functions. Compact and connected sets.

Functions of several real variables. Partial derivatives, higher derivatives. Taylor's formula. Local and absolute extrema. Implicit function theorem. Lagrange multipliers.

Preslikave $f: \mathbb{R}^n \rightarrow \mathbb{R}^m$, diferencial.

Integral s parametrom, Eulerjevi funkciji beta in gama.

Mappings $f: \mathbb{R}^n \rightarrow \mathbb{R}^m$, differentiability.

Euler, Gamma and beta functions.

Temeljni literatura in viri / Readings:

- ☐ J. Vrabec: *Metrični prostori*. Ljubljana: DMFA, 1993.
- ☐ D. Varberg, E. Purcell, S. Rigdon: *Calculus*. Prentice Hall, 2006.
- ☐ M. H. Protter, C. B. Morrey: *Intermediate calculus*. New York : Springer, 1985
- ☐ S. Lang: *Calculus of several variables*, Reading: Addison – Wesley, 1973.
- ☐ G. Fihtengol'ts: *Osvovy matematičeskogo analiza I, II, III*. Moskva: Fizmatgiz, 1956.
- ☐ M. Dobovišek: *Rešene naloge iz analize II*. Ljubljana: DMFA, 1996.
- ☐ B. Hvala: *Zbirka izpitnih nalog iz analize*. Ljubljana: DMFA, 1996.

Cilji in kompetence:

Posplošiti rezultate v zvezi z zveznostjo realnih funkcij na metrične prostore. Posplošiti rezultate v zvezi z odvedljivostjo realnih funkcij na preslikave več spremenljivk in preslikave $f: \mathbb{R}^n \rightarrow \mathbb{R}^m$.

Objectives and competences:

To generalize the results about the continuity of real functions to metric spaces. To generalize the concepts and results about the differentiation of real functions to functions of several variables and mappings $f: \mathbb{R}^n \rightarrow \mathbb{R}^m$.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Študent obvlada osnovne koncepte v metričnih prostorih. Zaveda se pomena kompaktnosti, polnosti in povezanosti metričnih prostorov.
- Študent razume posplošitve pojmov odvoda in diferenciala za funkcije več spremenljivk.
- Študent obvlada iskanje običajnih in vezanih ekstremov.
- Študent razume koncept integrala s parametrom in se seznani z Eulerjevima funkcijama gama in beta.

Prenesljive/ključne spretnosti in drugi atributi:

- Prenos znanja obravnavanih metod na druga področja, predvsem skozi uporabo diferenciala in z reševanjem konkretnih optimizacijskih problemov.

Intended learning outcomes:

Knowledge and Understanding:

- To understand basic concepts of metric spaces . To be aware of the importance of compactness, completeness and connectedness of metric spaces.
- To understand the generalization of the concept of derivative and differential for functions of several variables.
- To be able to apply the theory to the practical problems, in particular to solving extremum problems of different kinds.
- Acquaintance with the concept of the integral with parameter and with Gamma and Beta functions.

Transferable/Key Skills and other attributes:

- Knowledge transfer of treated methods into other fields, basically through the use of differential and by solving concrete optimisation problems.

Metode poučevanja in učenja:

Learning and teaching methods:

• Predavanja • Teoretične vaje	• Lectures • Theoretical exercises	
Načini ocenjevanja:	Assessment:	
Način (pisni izpit, ustno izpraševanje, naloge, projekt) Pisni test – praktični del Izpit (ustni) – teoretični del Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Pozitivna ocena pri pisnem testu je pogoj za pristop k izpitu.	Delež (v %) / Weight (in %) 50% 50%	Type (examination, oral, coursework, project): Written test – practical part Exam (oral) – theoretical part Each of the mentioned commitments must be assessed with a passing grade. Passing grade of the written test is required for taking the exam.
Reference nosilca / Lecturer's references:		
1. HVALA, Bojan. Diophantine Steiner triples. <i>Math. Gaz.</i>, March 2011, vol. 95, no. 532, str. 31-39. [COBISS.SI-ID 18256648] 2. HVALA, Bojan. Diophantine Steiner triples and Pythagorean-type triangles. <i>Forum geom.</i>, 2010, vol. 10, str. 93-97. http://forumgeom.fau.edu/FG2010volume10/FG201010.pdf. [COBISS.SI-ID 15669337] 3. HVALA, Bojan. Modernizing mathematics education in Slovenia : a teacher friendly approach. V: LAMANAUSKAS, Vincentas (ur.). <i>Challenges of science, mathematics and technology teacher education in Slovenia</i>, (Problems of education in the 21st century, vol. 14). Siauliai: Scientific Methodological Center Scientia Educologica, 2009, str. 34-43. [COBISS.SI-ID 17351944] 4. HVALA, Bojan. Generalized Lie derivations in prime rings. <i>Taiwan. j. math.</i>, dec. 2007, vol. 11, iss. 5, str. 1425-1430. [COBISS.SI-ID 15969288] 5. BREŠAR, Matej, HVALA, Bojan. On additive maps of prime rings. II. <i>Publ. math. (Debr.)</i>, 1999, letn. 54, št. 1/2, str. 39-54. [COBISS.SI-ID 8598617]		