



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	<b>Izbrana poglavja iz analize</b>
<b>Course title:</b>	<b>Selected Topics in Analysis</b>

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 3. stopnja		1. ali 2.	1. ali 3. ali 4.
Mathematics, 3 <sup>rd</sup> cycle		1 <sup>st</sup> or 2 <sup>nd</sup>	1 <sup>st</sup> or 3 <sup>rd</sup> ali 4 <sup>th</sup>

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30					150	6

Nosilec predmeta / Lecturer:

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

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

Znanje osnovnih pojmov in rezultatov iz analize (zveznost, diferencibilnost in integrabilnost; zaporedja in vrste).

**Prerequisites:**

Basic knowledge of fundamental notions and results of analysis (continuity, differentiability and integrability).

**Vsebina:**

Izbrana so posebna poglavja iz realne analize, teorije mere in integriranja, kompleksne analize, teorije potenciala, več kompleksnih spremenljivk, posebnih funkcij, zaporedij, vrst, sumabilnosti, Fourierjeve analize, analize na mnogoterostih ali katerega drugega modernega področja iz analize. Izbira poglavij je odvisna od interesa in raziskovalne usmerjenosti študentov. Spodaj navedena literatura praviloma služi le kot osnova in je nadgrajena z bolj specializiranimi teksti.

**Content (Syllabus outline):**

Special topics in real analysis, measure and integration theory, complex analysis, potential theory, several complex variables, special functions, sequences, series, summability, Fourier analysis, analysis on manifolds, or some other area of contemporary analysis are chosen. The choice depends on students' interests and their research orientation. The literature below in principle serves only as a basis, and is combined with more specialized texts.

**Temeljni literatura in viri / Readings:**

W. Rudin, Principles of mathematical analysis, McGraw-Hill, 1986

W. Rudin, Real and complex analysis, McGraw-Hill, 1987

**Dodatna literatura / Additional Readings:**

R.C. Buck, E.F. Buck: Advanced calculus, McGraw-Hill, 1965

M. Spivak: Calculus on manifolds, W.A. Benjamin, 1968

W.H. Fleming: Functions of several variables, Springer, 1977

M. Protter, C. Morrey, A first course in real analysis, Springer, 1991

L.V. Ahlfors, Complex analysis, McGraw-Hill, 1979

Z. Nehari, Conformal mapping, McGraw-Hill, 1952

M.P. Do Carmo, Differential forms and applications, Springer, 1994

M.P. Do Carmo, Riemannian geometry, Birkhäuser, 1992

S. Lang, Differential and Riemannian manifolds, Springer, 1995

D.J. Struik, Lectures on classical differential geometry, Addison-Wesley, 1961

S.G. Krantz, Function theory of several complex variables, John Wiley, 1982

**Cilji in kompetence:**

- študentu predstaviti moderno področje iz analize, kar lahko služi kot uvod v raziskovalno delo;
- Doseči poglobljeno razumevanje teoretskih in metodoloških konceptov s področja analize
- Razviti sposobnost za samostojno reševanje najzahtevnejših problemov iz analize.
- Zmožnost razvijanja kritične refleksije na področju analize

**Objectives and competences:**

- to present a modern area from analysis, which can serve as an introduction to student's research work;
- To achieve a deeper understanding of theoretical and methodological concepts of analysis
- To develop the ability for solving the most challenging problems in analysis.
- Ability to develop critical reflection in analysis

**Predvideni študijski rezultati:**

Znanje in razumevanje:

- poglobljeno znanje posebnega področja iz analize;
- poglobljeno razumevanje nekaterih posebnih pojmov iz analize.

Prenesljive/ključne spretnosti in drugi atributi:

- podlaga za raziskovalno delo na posebnem področju iz analize.

**Intended learning outcomes:**

Knowledge and understanding:

- a deeper knowledge of a special topic from analysis;
- a deeper understanding of some special concepts from analysis.

Transferable/Key Skills and other attributes:

- a basis for research in a special area of analysis

**Metode poučevanja in učenja:**

- predavanja;
- priprava seminarja;
- praktični primeri;
- konzultacije;
- samostojni študij.

**Learning and teaching methods:**

- lectures;
- seminar work;
- practical exercises;
- consultations;
- self-study.

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Načini ocenjevanja:	Weight (in %)	Assessment:
Seminarska naloga	50 %	Seminar paper
Teoretični izpit	50 %	Theoretical exam

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

1. FERČEC, Brigita, ŽULJ, Maja, MENCINGER, Matej. On the integrability of persistent quadratic three-dimensional systems. *Mathematics*. April 2024, vol. 12, no. 9, [article no.] 1338, 12 str. ISSN 2227-7390. <https://dk.um.si/lzpisGradiva.php?id=88769>, DOI: [10.3390/math12091338](https://doi.org/10.3390/math12091338). [COBISS.SI-ID [196478979](#)], [Odprti dostop, JCR,] kategorija: 1A1
2. FERČEC, Brigita, ŽULJ, Maja, GINÉ, Jaume. Blow-up method for linearizability of resonant differential systems. *International journal of bifurcation and chaos in applied sciences and engineering*. 2023, vol. 33, no. 08, str. 1-17. ISSN 1793-6551. <https://www.worldscientific.com/doi/10.1142/S0218127423501006>, DOI: [10.1142/S0218127423501006](https://doi.org/10.1142/S0218127423501006). [COBISS.SI-ID [159115267](#)], [JCR], kategorija: 1A2
3. FERČEC, Brigita, GINÉ, Jaume. The blow-up method applied to monodromic singularities. *Electronic journal of qualitative theory of differential equations*. 2024, no. 4, 18 str. ISSN 1417-3875. <https://www.math.u-szeged.hu/ejqtde/p10602.pdf>, DOI: [10.14232/ejqtde.2024.1.4](https://doi.org/10.14232/ejqtde.2024.1.4). [COBISS.SI-ID [181232643](#)], [JCR], kategorija: 1A1
4. FERČEC, Brigita, GINÉ, Jaume. Formal Weierstrass integrability for a Liénard differential system. *Journal of mathematical analysis and applications*. [Print ed.]. 2021, issue 1, art. 125016, 14 str. ISSN 0022-247X. DOI: [10.1016/j.jmaa.2021.125016](https://doi.org/10.1016/j.jmaa.2021.125016). [COBISS.SI-ID [49998851](#)], [JCR] kategorija: 1A1
5. ŽULJ, Maja, FERČEC, Brigita, MENCINGER, Matej. On integrability and linearizability of persistent  $p$ - $q$  resonant systems. *Journal of mathematical analysis and applications*. [Print ed.]. Nov. 2022, vol. 515, iss. 1 (126369), 19 str. ISSN 0022-247X. DOI: [10.1016/j.jmaa.2022.126369](https://doi.org/10.1016/j.jmaa.2022.126369). [COBISS.SI-ID [112287747](#)], [JCR] kategorija: 1A1