

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
<b>Predmet:</b>		Analiza 2a				
<b>Course title:</b>		Analysis 2a				
<b>Študijski program in stopnja</b> Study programme and level		<b>Študijska smer</b> Study field		<b>Letnik</b> Academic year	<b>Semester</b> Semester	
Univerzitetni študijski program Matematika		ni smeri		2	prvi	
First cycle academic study programme Mathematics		none		2	first	
<b>Vrsta predmeta / Course type</b>				obvezni		
<b>Univerzitetna koda predmeta / University course code:</b>				M0253		
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike študija</b>	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
60		45			135	8
<b>Nosilec predmeta / Lecturer:</b>		prof. Barbara Drinovec Drnovšek, prof. Franc Forstnerič, prof. Miran Černe				
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b>		slovenski/Slovene		
		<b>Vaje / Tutorial:</b>		slovenski/Slovene		
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
Opravljen predmet Analiza 1.				Completed course Analysis 1.		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		

<p>Funkcije več spremenljivk. Zveznost. Parcialni odvodi in diferenciability. Jacobijeva matrika in determinanta. Diferencial sestavljene funkcije. Izrek o implicitni in inverzni preslikavi. Višji parcialni odvodi. Taylorjeva formula. Prosti in vezani ekstremi.</p> <p>Integrali s parametrom, zveznost in odvedljivost. Fubinijev izrek. Klasične Fourierove vrste. Fourierova transformacija. Osnovne lastnosti. Inverzna formula. Plancherelov izrek.</p> <p>Večkratni Riemannov integral. Lastnosti. Množice z ničelnim volumnom in mero. Izrek o obstoju integrala. Prevedba na večkratni integral. Posplošeni integrali. Uporaba integralov v geometriji in fiziki.</p>	<p>Functions of several variables. Continuity. Partial derivatives and differentiability. Jacobian matrix and determinant. Differential of a composed mapping. Implicit function theorem and inverse function theorem. Higher order partial derivatives. Taylor's formula. Free and constrained extrema.</p> <p>Parametric integrals, continuity and differentiability. Fubini's theorem. Classical Fourier series. Fourier transform. Elementary properties. Inverse formula. Plancherel theorem.</p> <p>Multiple Riemann integral. Properties. Sets with zero volume and measure. Theorem on the existence of integrals. Transformation into a multiple integral. Improper integrals. The use of integrals in geometry and physics.</p>
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**Temeljni literatura in viri / Readings:**

Vidav: Višja Matematika I, DMFA-založništvo, Ljubljana, 1994.

Vidav: Višja Matematika II, DZS, Ljubljana, 1981.

T. M. Apostol: Calculus II : Multi-Variable Calculus and Linear Algebra with Applications, 2nd edition, John Wiley & Sons, New York, 1975.

J. E. Marsden, A. J. Tromba: Vector Calculus, 5th edition, Freeman, New York, 2004.

Suhadolc: Integralske transformacije/Integralske enačbe, DMFA-založništvo, Ljubljana, 1994.

A. Suhadolc: Metrični prostor, Hilbertov prostor, Fourierova analiza, Laplaceova transformacija, DMFA-založništvo, 1998

**Cilji in kompetence:**

Študent se seznani z diferencialnim in integralnim računom funkcij več realnih spremenljivk.

**Objectives and competences:**

Student becomes familiar with the differential and the integral calculus of functions of several real variables.

**Predvideni študijski rezultati:**

**Intended learning outcomes:**

Znanje in razumevanje: Razumevanje diferencialnega in integralnega računa funkcij več spremenljivk ter sorodnih tem. Uporaba razvitih metod v geometriji in naravoslovju. Uporaba: Analiza 2a sodi med temeljne predmete pri študiju matematike vseh usmeritev in je pogoj za vpis predmetov Analiza 3, Teorija mere, Funkcionalna analiza, Verjetnost in statistika, Analiza na mnogoterostih.

Refleksija: Razumevanje teorije na podlagi primerov in uporabe.

Prenosljive spretnosti – niso vezane le na en predmet: Postavitev problema, izbira primerne metode, reševanje problema, analiza doseženega rezultata na primerih. Formulacija problemov v matematičnem jeziku. Spretnost uporabe domače in tuje literature.

Knowledge and understanding: Understanding of the differential and the integral calculus of functions of several variables and related topics. Application of these methods in geometry and natural science.

Application: Analysis 2a is one of the fundamental courses in mathematical studies. It is a prerequisite for the courses Analysis 3, Measure theory, Functional analysis, Probability and statistics, Analysis on manifolds.

Reflection: Understanding of the theory based on examples and applications.

Transferable skills: The ability to design the problem, select an appropriate method, solve the problem, and analyse the results on test cases. The ability to formulate a problem in mathematical language. Skills in using the domestic and foreign literature.

**Metode poučevanja in učenja:**

Predavanja, vaje, domače naloge, konzultacije

**Learning and teaching methods:**

Lectures, exercises, homework, consultations

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt): 2 kolokvija namesto izpita iz vaj, izpit iz vaj,  izpit iz teorije</p> <p>ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)</p>	<p>50%</p> <p>50%</p>	<p>Type (examination, oral, coursework, project): 2 midterm exams instead of written exam, written exam</p> <p>oral exam</p> <p>grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)</p>
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#### Reference nosilca / Lecturer's references:

Miran Černe:

- ČERNE, Miran. Maximal plurisubharmonic functions and the polynomial hull of a completely circled fibration. Arkiv för matematik, ISSN 0004-2080, 2002, vol. 40, no. 1, str. 27-45 [COBISS.SI-ID 11623513]
- ČERNE, Miran, FORSTNERIČ, Franc. Embedding some bordered Riemann surfaces in the affine plane. Mathematical research letters, ISSN 1073-2780, 2002, vol. 9, no. 5-6, str. 683-696 [COBISS.SI-ID 12391257]
- ČERNE, Miran. Nonlinear Riemann-Hilbert problem for bordered Riemann surfaces. American journal of mathematics, ISSN 0002-9327, 2004, vol. 126, no. 1, str. 65-87 [COBISS.SI-ID 12895577]

Barbara Drinovec Drnovšek:

- DRINOVEC-DRNOVŠEK, Barbara. Discs in Stein manifolds containing given discrete sets. Mathematische Zeitschrift, ISSN 0025-5874, 2002, vol. 239, no. 4, str. 683-702 [COBISS.SI-ID 11567449]
- DRINOVEC-DRNOVŠEK, Barbara. Proper holomorphic discs avoiding closed convex sets. Mathematische Zeitschrift, ISSN 0025-5874, 2002, vol. 241, no. 3, str. 593-596 [COBISS.SI-ID 12076377]
- DRINOVEC-DRNOVŠEK, Barbara. Proper discs in Stein manifolds avoiding complete pluripolar sets. Mathematical research letters, ISSN 1073-2780, 2004, vol. 11, no. 5-6, str. 575-581 [COBISS.SI-ID 13311065]

Franc Forstnerič:

- FORSTNERIČ, Franc, ROSAY, Jean-Pierre. Approximation of biholomorphic mappings by automorphisms of  $\mathbb{C}^n$ . Inventiones Mathematicae, ISSN 0020-9910, 1993, let. 112, št. 2, str. 323-349 [COBISS.SI-ID 9452121]
- ČERNE, Miran, FORSTNERIČ, Franc. Embedding some bordered Riemann surfaces in the affine plane. Mathematical research letters, ISSN 1073-2780, 2002, vol. 9, no. 5-6, str. 683-696

[COBISS.SI-ID 12391257]

– FORSTNERIČ, Franc. Noncritical holomorphic functions on Stein manifolds. *Acta mathematica*, ISSN 0001-5962, 2003, vol. 191, no. 2, str. 143-189 [COBISS.SI-ID 13138009]

– FORSTNERIČ, Franc. Runge approximation on convex sets implies the Oka property. *Annals of mathematics*, ISSN 0003-486X, 2006, vol. 163, no. 2, str. 689-707 [COBISS.SI-ID 13908825]