

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)						
<b>Predmet:</b>	Analiza 2a					
<b>Course title:</b>	Analysis 2a					
<b>Študijski program in stopnja</b> <b>Study programme and level</b>	<b>Študijska smer</b> <b>Study field</b>		<b>Letnik</b> <b>Academic year</b>		<b>Semester</b> <b>Semester</b>	
Univerzitetni študijski program Matematika	ni smeri		2		prvi	
First cycle academic study programme Mathematics	none		2		first	
<b>Vrsta predmeta / Course type</b>			obvezni / compulsory			
<b>Univerzitetna koda predmeta / University course code:</b>			M0253			
<b>Predavanja</b> <b>Lectures</b>	<b>Seminar</b> <b>Seminar</b>	<b>Vaje</b> <b>Tutorial</b>	<b>Klinične vaje</b> <b>work</b>	<b>Druge oblike</b> <b>študija</b>	<b>Samost. delo</b> <b>Individ. work</b>	<b>ECTS</b>
60		45			135	8
<b>Nosilec predmeta / Lecturer:</b>			prof. dr. Miran Černe, prof. dr. Barbara Drinovec Drnovšek, prof. dr. Franc Forstnerič			
<b>Jeziki /</b> <b>Languages:</b>	<b>Predavanja /</b> <b>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>			
Vpis v letnik študija.			Enrolment in the programme.			
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 ekstrema.</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 seznanja 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

#### Načini ocenjevanja:

Delež (v %) /

Weight (in %)

#### Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

50%

Type (examination, oral, coursework, project):

2 kolokvija namesto izpita iz vaj, izpit iz vaj,

50%

2 midterm exams instead of written exam, written exam

izpit iz teorije

oral exam

ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)

grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

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

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]

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. 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]

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]

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]

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, 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]