Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS								
Predmet:	**Analiza II**							
Course title:	Analysis II							
Študijski program in stopnja Study programme and level		**Študijska smer Study field**				**Letnik Academic year**		**Semester Semester**
Matematika						**1.**		**2.**
Mathematics						**1.**		**2.**
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**				**150**		**9**
Nosilec predmeta / Lecturer:	Iztok Banič							
Jeziki / Languages:	**Predavanja / Lectures:**	SLOVENSKO/SLOVENE						
	Vaje / Tutorial:	SLOVENSKO/SLOVENE						

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Jih ni.	There are none.
Vsebina:	**Content (Syllabus outline):**
Odvod: konveksnost, lokalni ekstremi, L'Hospitalovo pravilo in Taylorjeva formula. Integral: primitivna funkcija in nedoločeni integral, Riemannove in Darbouxjeve vsote; Newton-Leibnizova formula; uporaba integrala; posplošeni integrali. Funkcijska zaporedja in vrste: konvergenca po točkah, enakomerna konvergenca; realne in kompleksne potenčne vrste; Taylorjeve vrste.	Derivation: convexity, local extrema, L'Hospital rule and Taylor's formula. Integral: primitive function and indefinite integral; definite integral, Riemann and Darboux sums; Newton-Leibniz formula; applications of integrals; improper integrals. Sequences and series of functions: pointwise convergence, uniform convergence; real and complex power series; Taylor series.

Trigonometrijske vrste: Fourierjeve vrste na $[-\pi,\pi]$, Fourierjeve vrste na poljubnem intervalu, izrek o konvergenci, sinusne in kosinusne Fourierjeve vrste.	Trigomometric series: Fourier series on $[-\pi,\pi]$, Fourier series on arbitrary interval, the convergence theorem, sine and cosine Fourier series.

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.
M. Stoll, Introduction to real analysis, 2nd edition, Pearson, 2001.
I. Vidav, Višja matematika I, II, DZS, Ljubljana, 1974.

Cilji in kompetence:

Razumevanje nekaterih zahtevnejših pojmov analize.

Študentje obvladajo temeljne pojme in metode realne analize na nivoju diferencialnega in integralnega računa funkcij ene realne spremenljivke. Te pojme in metode so sposobni uporabiti pri nadaljnjem študiju matematike.

Objectives and competences:

Understanding some advanced concepts of analysis.

Students learn the fundamental concepts and methods of the real analysis and calculus of functions of one real variable. The students are able to use the concepts and methods later in the study of mathematics.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Odvoda.
- Integrala.
- Funkcijskih zaporedij in vrst.
- Fourierjevih vrst.

Po uspešnem zaključku tega predmeta bodo študentje:
1. Razumeli pojem odvoda funkcij in znali računati odvode.
2. Znali uporabiti odvod pri analizi poteka funkcije; obravnavi monotonosti, konveksnosti in konkavnosti; določanju ekstremov in prevojev.

Intended learning outcomes:

Knowledge and Understanding:

- Derivation.
- Integration.
- Sequences and series of functions.
- Fourier series.

After successful conclusion of this course the students will:
1. Understand the concept of the derivative of a function and know how to calculate them.
2. Know how to use derivatives in determining the graph of a function; in study of monotonicity, convexity, maxima and minima, inflexion points.

3. Obvladali Lagrangeov izrek in L'Hospitalovo pravilo. 4. Obvladali delo z zaporedji, vrstami, potenčnimi vrstami, Taylorjevimi vrstami, Fourierjevimi vrstami. 5. Razumeli pojem nedoločenega integrala, obvladali metode integriranja in jih znali uporabiti. 6. Razumeli pojem določenega integrala, obvladali Newton-Leibnizovo formulo in njeno uporabo. 7. Znali uporabiti določeni integral v različnih situacijah. Prenesljive/ključne spretnosti in drugi atributi: • Pridobljena znanja so podlaga za večino predmetov v nadaljevanju študija.	3. Know how to use mean value theorems and L'Hospital's rule. 4. Know how to use sequences, series, power series, Taylor's series, Fourier series. 5. Understand the concept of the indefinite integral and know the methods of integration, and how to use them. 6. Understand the concept of the definite integrals and know the fundamental theorem of the calculus, and how to use it. 7. Know different applications of definite integral. Transferable/Key Skills and other attributes: • The obtained knowledge is a basis for most of the later subjects.
Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Teoretične vaje	• Lectures • Theoretical exercises
Načini ocenjevanja:	**Assessment:**

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

Reference nosilca / Lecturer's references:

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in matematiko

1. BANIČ, Iztok, ERCEG, Goran, KENNEDY, Judy A. A transitive homeomorphism on the Lelek fan. *Journal of difference equations and applications*. 2023, 26 str. ISSN 1023-6198. DOI: 10.1080/10236198.2023.2208242.

2. BANIČ, Iztok, ERCEG, Goran, KENNEDY, Judy A. The Lelek fan as the inverse limit of intervals with a single set-valued bonding function whose graph is an arc. *Mediterranean journal of mathematics*. Jun. 2023, vol. 20, iss. 3, article no. 159, 24 str. ISSN 1660-5446. DOI: 10.1007/s00009-023-02323-3.

3. BANIČ, Iztok, ERCEG, Goran, GREENWOOD, Sina, KENNEDY, Judy A. Transitive points in CR-dynamical systems. *Topology and its Applications*. [Print ed.]. 2023, vol. 326, [article no.] 108407, 31 str. ISSN 0166-8641. DOI: 10.1016/j.topol.2023.108407.

4. BANIČ, Iztok, ERCEG, Goran, KENNEDY, Judy A. Mapping theorems for inverse limits with set-valued bonding functions. *Bulletin of the Malaysian Mathematical Sciences Society*. Nov. 2022, vol. 45, iss. 6, str. 2905-2940. ISSN 0126-6705. DOI: 10.1007/s40840-022-01307-y.

5. BANIČ, Iztok, ERCEG, Goran, KENNEDY, Judy A. Closed relations with non-zero entropy that generate no periodic points. *Discrete and continuous dynamical systems*. 2022, vol. 42, no. 10, str. 5137-5166. ISSN 1078-0947. DOI: 10.3934/dcds.2022089.