



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

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

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna matematika – dvopredmetni, 1. stopnja		3.	5.
Educational mathematics – Double-major, 1 <sup>st</sup> degree		3.	5.

**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
45		30			105	6

**Nosilec predmeta / Lecturer:**

<b>Jeziki / Languages:</b>	<b>Predavanja / Lectures:</b>	<input type="text" value="SLOVENSKO/SLOVENE"/>
	<b>Vaje / Tutorial:</b>	<input type="text" value="SLOVENSKO/SLOVENE"/>

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

**Prerequisites:**

**Vsebina:**

Funkcije več spremenljivk, ekstremi, vezani ekstremi. Primeri uporabe.

Ploščina, volumen, dvojni, trojni integral. Polarne, cilindrične in sferne koordinate.

Krivulje in ploskve. Parametrizacija. Tangenta, tangentska ravnina. Dolžina krivulje, ploščina ploskve. Primeri.

**Content (Syllabus outline):**

Functions of several real variables. Local and absolute extrema. Lagrange multipliers. Applications.

Area, volume. Double and triple integrals. Polar, cylindrical and spherical coordinates.

Curves and surfaces. Parametrization. Tangent. Arc length, surface area. Examples.

Diferencialne enačbe. Osnovni tipi navadnih diferencialnih enačb. Primeri uporabe.

Differential equations. Basic types of ordinary differential equations. Applications.

**Temeljni literatura in viri / Readings:**

- F. in B. Brešar: *Analiza II*, Maribor: Feri, 2005
- F. in B. Brešar: *Analiza III*, Maribor: Feri, 2005
- G.F. Simmons, J.S. Robertson: *Differential equations with applications and historical notes*, New York: McGraw Hill, 1991.
- M. H. Protter, C. B. Morrey: *Intermediate calculus*. New York : Springer, 1985

**Cilji in kompetence:**

Študent se seznanja s tistimi poglavji matematične analize funkcij več spremenljivk, ki so najbolj aktualna pri opisu situacij in reševanju problemov z različnih področij matematike, naravoslovje in širše.

**Objectives and competences:**

Student get insight in those chapters of the theory of functions of more variables that provide the most illustrative examples of applications of the theory to the description and solving problems in different areas of mathematics, sciences and wider.

**Predvideni študijski rezultati:**

Znanje in razumevanje:

- Študent spozna osnovna dejstva o funkcijah več spremenljivk in njihovi uporabi, predvsem pri ekstremalnih problemih.
- Seznanja se z integracijo funkcij po merljivih množicah v prostoru.
- Izve najosnovnejše o krivuljah in ploskvah.
- Posveti se diferencialnim enačbam, s posebnim poudarkom na njihovi uporabi pri opisu in obravnavi konkretnih problemov.

Prenosljive/ključne spretnosti in drugi atributi:

- Ilustracija dejstva, da nam teorija, navidez oddaljene od realnosti, lahko ponudi mnoge praktično uporabne rezultate.

**Intended learning outcomes:**

Knowledge and Understanding:

- Knowing basic facts about functions of several variables and being aware of the possible applications of this theory, specially in solving external problems.
- Knowing concepts of integration on measurable subsets of plane and space.
- Knowing the basic facts about curves and surfaces.
- Being familiar with ordinary differential equations and with their applications to concrete problems.

Transferable/Key Skills and other attributes:

- An illustration of the fact, that a more abstract theory can give us many nice results with useful practical applications.

**Metode poučevanja in učenja:**

- Predavanja
- Teoretične vaje

**Learning and teaching methods:**

- Lectures
- Theoretical exercises

**Načini ocenjevanja:**

**Assessment:**

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

Delež (v %) /  
Weight (in %)

Type (examination, oral, coursework, project):

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.	50% 50%	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.
<b>Reference nosilca / Lecturer's references:</b>		

1. BREŠAR, Boštjan, JAKOVAC, Marko, KATRENIČ, Ján, SEMANIŠIN, Gabriel, TARANENKO, Andrej. On the vertex  $k$ -path cover. *Discrete Applied Mathematics*, ISSN 0166-218X. [Print ed.], 2013, vol. 161, iss. 13/14, str. 1943-1949. <http://dx.doi.org/10.1016/j.dam.2013.02.024>. [COBISS.SI-ID [19859464](#)]
2. JAKOVAC, Marko, TARANENKO, Andrej. On the  $k$ -path vertex cover of some graph products. *Discrete Mathematics*, ISSN 0012-365X. [Print ed.], 2013, vol. 313, iss. 1, str. 94-100. <http://dx.doi.org/10.1016/j.disc.2012.09.010>, doi: [10.1016/j.disc.2012.09.010](http://dx.doi.org/10.1016/j.disc.2012.09.010). [COBISS.SI-ID [19464968](#)]
3. JAKOVAC, Marko, PETERIN, Iztok. On the  $b$ -chromatic number of some graph products. *Studia scientiarum mathematicarum Hungarica*, ISSN 0081-6906, 2012, vol. 49, no. 2, str. 156-169. <http://dx.doi.org/10.1556/SScMath.49.2012.2.1194>. [COBISS.SI-ID [16321113](#)]
4. CABELLO, Sergio, JAKOVAC, Marko. On the  $b$ -chromatic number of regular graphs. *Discrete Applied Mathematics*, ISSN 0166-218X. [Print ed.], 2011, vol. 159, iss. 13, str. 1303-1310. <http://dx.doi.org/10.1016/j.dam.2011.04.028>, doi: [10.1016/j.dam.2011.04.028](http://dx.doi.org/10.1016/j.dam.2011.04.028). [COBISS.SI-ID [15914329](#)]
5. JAKOVAC, Marko, KLAVŽAR, Sandi. The  $b$ -chromatic number of cubic graphs. *Graphs and combinatorics*, ISSN 0911-0119, 2010, vol. 26, no. 1, str. 107-118. <http://dx.doi.org/10.1007/s00373-010-0898-9>. [COBISS.SI-ID [15522905](#)]