

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Matematika 1
Course title:	Mathematics 1

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Računalništvo in spletne tehnologije, visokošolski strokovni študijski program prve stopnje	-	Prvi	Prvi
Computer Science and Web Technologies, first cycle Professional Study Programme	-	First	First

Vrsta predmeta / Course type Obvezni / Obligatory

Univerzitetna koda predmeta / University course code: 2-RST-VS-M1-2016-10-01

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	-	45	-	-	105	6

Nosilec predmeta / Lecturer:

Jeziki / Languages:	Predavanja / Lectures:	Slovenski / Slovenian, Angleški / English
	Vaje / Tutorial:	Slovenski / Slovenian, Angleški / English

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

Pogoj za vključitev v delo je vpis v 1. letnik študija. Pogoj za pristop k izpitu so opravljene vse obveznosti na vajah.

Prerequisites:

The prerequisite is enrolment into the first year of the study. Student has to pass all requirements given at the exercises before examination.

Vsebina:

- *Uvod:*
osnove matematičnega sklepanja, teorija množic, številski sistemi.
- *Zaporedja:*
definicija, lastnosti zaporedij, konvergenca, posebna zaporedja, uporaba zaporedij v računalništvu, informatiki in družboslovju.

Content (Syllabus outline):

- *Introduction:*
basics of mathematical reasoning, set theory and numeral systems.
- *Sequences:*
definition and basic properties, convergence, special sequences, application of sequences in computer, information and social science.

<ul style="list-style-type: none"> • Vrste: definicija, konvergenca, konvergenčni kriteriji (korenski, kvocientni, Leibnitzov), posebne vrste. • Funkcije: definicija funkcije, lastnosti funkcije, graf realnih funkcij, zveznost, inverzna funkcija, posebne funkcije (polinomi, racionalne f., eksponentna in logaritemska funkcija), limita funkcije, polarni in parametrični zapis funkcij, uporaba funkcij v računalništvu, informatiki in družboslovju. • Odvod: definicija, lastnosti, odvodi elementarnih funkcij, uporaba odvoda pri risanju funkcij, pri določanju ekstremov, pri določanju prevojev, diferencial, Taylorjeva vrsta, uporaba odvoda v računalništvu, informatiki in družboslovju. • Nedoločeni integral: definicija nedoločenega integrala, metode za računanje nedoločenih integralov (substitucija, integracija po delih), integracija racionalnih in trigonometričnih funkcij, diferencialne enačbe, uporaba v računalništvu, informatiki in družboslovju. • Določeni integral: definicija in pomen določenega integrala, uporaba pri računanju dolžin krivulj, ploščin likov ter površin in prostornin rotacijskih teles, nepravilni integral, uporaba v računalništvu, informatiki in družboslovju. 	<ul style="list-style-type: none"> • Series: definition, convergence, convergent criteria (D'Alembert, Quotient, Leibnitz criteria), special series. • Functions: definition, properties, graph of a real function, limits, continuity, inverse of a function, special real functions (polynomials, rational functions, exponent and logarithmic function), limit of a function, polar and parametric formulation of function, application of functions in computer, information and social science. • Derivatives: definition, properties, derivatives of basic real functions, application of derivatives in drawing graphs and calculating extreme and saddle points. Differential, Taylor series, application of derivatives in computer, information and social science. • Indefinite integral: definition, basic methods for calculating the indefinite integral (substitution, per partes), integration of rational and trigonometric functions, application in computer, information and social science. • Definite integral: definition, application in calculating length of curves, areas under graphs and volume or surface of rotations; improper integral, application in computer, information and social science.
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Temeljni literatura in viri / Readings:

- USENIK, JANEZ (2006) *Matematične metode v logistiki*, Valvasorjev raziskovalni center, Krško.
- POVH, JANEZ, PUSTAVRH, SIMONA, FOŠNER, MAJA, GORŠE PIHLER, MELITA in ZALAR, BOJANA (2010) *Matematične metode v uporabi*. Ljubljana: Društvo matematikov, fizikov in astronomov Slovenije.
- DOBOVIŠEK, MIRKO (2007) *Matematika za farmacevte*. Ljubljana: Društvo matematikov, fizikov in astronomov Slovenije.
- ROSS, KENNETH ALLEN (1980) *Elementary Analysis: The Theory of Calculus*. New York: Springer.
- LARSON, RON in EDWARDS, BRUCE H. (2006) *Calculus of a Single Variable*. Belmont: Brooks/Cole, Cengage Learning.
- POVH, JANEZ, PUSTAVRH, SIMONA in GORŠE PIHLER, MELITA (2010) *Zbirka rešenih nalog iz matematike 1*. Ljubljana: Vega.

Cilji in kompetence:

Učna enota prispeva k razvoju naslednjih splošnih in predmetno-specifičnih kompetenc:

Splošne kompetence:

- poznavanje osnov računalništva in informacijskih tehnologij
- poznavanje pomena kakovosti in prizadevanj za kakovost strokovnega dela skozi avtonomnost, samoiniciativnost, (samo)kritičnost, (samo)refleksivnost in (samo) evalviranje v strokovnem delu
- sposobnost fleksibilne uporabe znanja v praksi
- sposobnost logičnega sklepanja, ocenjevanja velikostnega reda rezultata, natančnosti izražanja, pisanja in razmišljanja

Predmetno-specifične kompetence:

- poznavanje temeljnih matematičnih metod iz področja realne analize
- sposobnost pretvorbe matematičnih metod v algoritem in izvajanje tega algoritma v primernem računalniškem okolju

Objectives and competences:

The instructional unit contributes to the development of the following general and subject-specific competences:

General competences:

- familiarity with the basics of computer science and information technology
- familiarity with the importance of quality, striving to maintain the quality of professional work through practicing autonomous behaviour, showing initiative, as well as through (self-) criticism, (self-)reflection and (self-) evaluation
- ability to use the acquired knowledge in practice in a flexible manner
- ability to make logical reasoning, to estimate the order of magnitude of the result as well as the ability to express oneself, write and think in an accurate manner

Subject-specific competences:

- familiarity with the fundamental mathematical methods from calculus
- ability to transform mathematical method into an algorithm and coding this algorithm within appropriate software framework

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent/študentka:

- usvoji pojme metode matematične analize in linearne algebre
- se navadi logičnega sklepanja, nauči se oceniti velikostni red rezultata, natančnosti izražanja, pisanja in razmišljanja
- se usposobi za uporabo matematike kot teoretičnega orodja v računalništvu in družboslovju

Intended learning outcomes:

Knowledge and understanding:

The student:

- entrenches concepts of mathematical analysis and linear algebra
- gets used to logical deduction, learns how to determine size of the result set, accuracy of expression, writing and thinking
- is trained for the usage of mathematics as a theoretical tool in computer and social sciences

Metode poučevanja in učenja:

- *predavanja* z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov)
- *vaje*, kjer bodo študentje na konkretnih problemih ponovili, utrdili in dodatno osvetlili pojme in metode, spoznane na predavanjih

Learning and teaching methods:

- *lectures* with active student participation (explanation, discussion, questions, examples, problem solving)
- *tutorials* where students will rehearse, revise and lit up concepts, and methods encountered at lectures

- *domače naloge*, s katerimi bodo študentje sproti ponavljali in utrjevali snov
- *kolokviji*: z njimi bodo študentje stimulirani, da sproti študirajo snov, ki bo obravnavana na predavanjih in vajah

- *homeworks*, that will force students to study and consolidate knowledge continuously
- *mid-term examinations* will stimulate students to study the matter dealt with at lectures and tutorials simultaneously

Delež (v %) /

Weight (in %)

Načini ocenjevanja:

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
<ul style="list-style-type: none"> • ustni izpit • pisni izpit ali sprotno delo: kolokviji, kvizi, domače naloge 	<p>30</p> <p>70</p>	<ul style="list-style-type: none"> • oral exam • written exam or intermediate work: mid-term examinations, quizzes, homeworks
<p>Za pristop k ustnemu izpitu je potrebno s pisnim izpitom ali s sprotnim delom zbrati vsaj 51% možnih točk.</p>		<p>As a prerequisite for the oral examination student must gain at least 51 % of possible points with intermediate work or with written exam.</p>
<p>Ustnega izpita ni potrebno opravljati, kadar študent s pisnim izpitom ali sprotnim delom zbere vsaj 70% točk in je bil vsaj 50% na predavanjih.</p>		<p>Students who have gained at least 70 % with intermediate work or written exam and have participated at least 50 % of lectures are exempt from the oral examination.</p>