



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
Predmet:	Algebra I					
Course title:	Algebra I					
Študijski program in stopnja Study programme and level	Študijska smer Study field			Letnik Academic year	Semester Semester	
Matematika				3.	5.	
Mathematics				3.	5.	
Vrsta predmeta / Course type				obvezni / compulsory		
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		45			135	8
Nosilec predmeta / Lecturer:				Matej Brešar		
Jeziki / Languages:	Predavanja / Lectures:		SLOVENSKO/SLOVENE			
	Vaje / Tutorial:		SLOVENSKO/SLOVENE			
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Linearna algebra				Linear algebra		
Vsebina:				Content (Syllabus outline):		

<p>Pregled algebrskih struktur: polgrupe, grupe, kolobarji, polja, vektorski prostori, algebre. Podstrukture. Generatorji. Direktni produkti in vsote.</p> <p>Primeri grup in kolobarjev: cela števila, grupa in kolobar ostankov, kvaternioni, kolobarji matrik in linearne grupe, kolobarji funkcij, kolobarji polinomov, simetrične grupe, diedrske grupe.</p> <p>Homomorfizmi: osnovni pojmi in primeri. Cayleyev izrek. Polje ulomkov.</p> <p>Kvocientne strukture: podgrupe edinke in kvocientne grupe, ideali in kvocientni kolobarji, izreki o izomorfizmu.</p> <p>Končne grupe: Lagrangeov izrek, Cauchyev izrek, delovanja grup, izreki Sylowa, enostavne grupe, končne Abelove grupe.</p>	<p>An overview of algebraic structures: semigroups, groups, rings, fields, vector spaces, algebras. Substructures. Generators. Direct products and sums.</p> <p>Examples of groups and rings: the integers, the integers modulo n, the quaternions, matrix rings and linear groups, rings of functions, polynomial rings, symmetric groups, dihedral groups.</p> <p>Homomorphisms: basic notions and examples. Cayley's theorem. Field of fractions.</p> <p>Quotient structures: normal subgroups and quotient groups, ideals and quotient rings, isomorphism theorems.</p> <p>Finite groups: Lagrange's theorem, Cauchy's theorem, group actions, Sylow theorems, simple groups, finite Abelian groups.</p>
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Temeljna literatura in viri / Readings:

M. Brešar, Uvod v algebro, DMFA, 2018.
M. Brešar, Undergraduate algebra. A unified approach, Springer, 2019.
D. S. Dummit, R. M. Foote, Abstract Algebra, Prentice-Hall International, Inc., 1991.
J. Gallian: Contemporary Abstract Algebra, Brooks/Cole, 2013.
I. Vidav, Algebra, DMFA, 1980.

Cilji in kompetence:	Objectives and competences:
Spoznati temeljne algebraične pojme in abstraktni način razmišljanja.	Learning fundamental algebraic concepts and abstract thinking.
Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: <ul style="list-style-type: none"> Razumevanje osnovnih algebrskih struktur, njihovih podstruktur, homomorfizmov in kvocientnih struktur. Poznavanje osnov teorije končnih grup. 	Knowledge and Understanding: <ul style="list-style-type: none"> The knowledge of basic algebraic structures and their substructures, homomorphisms, and quotient structures. Understanding the basics of the theory of finite groups.
Prenesljive/ključne spretnosti in drugi atributi: <ul style="list-style-type: none"> Pridobljena znanja so podlaga za študij skoraj vseh matematičnih področij. 	Transferable/Key Skills and other attributes: <ul style="list-style-type: none"> The obtained knowledge is a prerequisite for a study of almost any area of mathematics.

Metode poučevanja in učenja:		Learning and teaching methods:	
<ul style="list-style-type: none"> • Predavanja • Seminarske vaje 		<ul style="list-style-type: none"> • Lectures • Tutorial 	
Načini ocenjevanja:		Assessment:	
Način (pisni izpit, ustno izpraševanje, naloge, projekt):	Delež (v %) / Weight (in %)	Type (examination, oral, coursework, project):	
Pisni izpit – problemi	50%	Written exam – problems	
Ustni izpit – teorija	50%	Oral exam – theoretical part	
Pisni izpit se lahko nadomesti z dvema delnima testoma (sprotni obveznosti).		Written exam can be replaced by two partial tests (mid-term testing).	
Oba izpita, pisni in ustni, morata biti opravljena s pozitivno oceno.		Each of the two exams, oral and written, must be assessed with a passing grade.	
Opravljen pisni izpit je pogoj za pristop k ustnemu izpitu.		Passing the written exam is a prerequisite for taking the oral exam.	
Reference nosilca / Lecturer's references:			
<p>1. BREŠAR, Matej. <i>Undergraduate algebra : a unified approach</i>, (Springer undergraduate mathematics series). Cham: Springer, cop. 2019. XXIV, 316 str.</p> <p>2. BREŠAR, Matej, GOGIĆ, Ilja. Centrally stable algebras. <i>Journal of algebra</i>. Nov. 2019, vol. 537, str. 79-97.</p> <p>3. J. ALAMINOS, J., BREŠAR, Matej, EXTREMERA, J., VILLENA, A. R. Zero Lie product determined Banach algebras, II. <i>Journal of mathematical analysis and applications</i>. [Print ed.]. June 2019, vol. 474, iss. 2, str. 1498-1511.</p> <p>4. BREŠAR, Matej, GUO, Xiangqian, LIU, Genqiang, LÜ, Rencai, ZHAO, Kaiming. Zero product determined Lie algebras. <i>European journal of mathematics</i>. [Print ed.]. Jun. 2019, vol. 5, iss. 2, str. 424-453.</p> <p>5. BREŠAR, Matej, ŠEMRL, Peter. Continuous commuting functions on matrix algebras. <i>Linear Algebra and its Applications</i>. [Print ed.]. May 2019, vol. 568, str. 29-38.</p>			