



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
<b>Predmet:</b>		<b>Izbrana poglavja iz algebre</b>				
<b>Course title:</b>		Selected topics in algebra				
<b>Študijski program in stopnja</b> Study programme and level		<b>Študijska smer</b> Study field		<b>Letnik</b> Academic year	<b>Semester</b> Semester	
Izobraževalna matematika, dvpredmetni študij, 2. stopnja		Modul D1		1. ali 2.	1. ali 3.	
Educational mathematics, double major 2 <sup>nd</sup> degree		Module D1		1. or 2.	1. or 3.	
<b>Vrsta predmeta / Course type</b>						
<b>Univerzitetna koda predmeta / University course code:</b>						
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Sem. vaje</b> Tutorial	<b>Lab. vaje</b> Laboratory work	<b>Teren. vaje</b> Field work	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
30		30			60	4
<b>Nosilec predmeta / Lecturer:</b>		Mateja GRAŠIČ				
<b>Jeziki / Languages:</b>		<b>Predavanja/Lectures:</b>		SLOVENSKO/SLOVENE		
		<b>Vaje / Tutorial:</b>		SLOVENSKO/SLOVENE		
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
Ne.				None.		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		
<ul style="list-style-type: none"> <li>• Grupe in podgrupe. Simetrične grupe.</li> <li>• Konjugiranost elementov in podgrup.</li> <li>• Homomorfizmi in izomorfizmi grup.</li> <li>• Podgrupe edinke in factorske grupe.</li> <li>• Delovanje grupe na množico.</li> <li>• Sylowske podgrupe, izreki Sylowa.</li> <li>• Kolobar, ideal, obseg.</li> <li>• Karakteristika kolobarja. Končna polja.</li> </ul>				<ul style="list-style-type: none"> <li>• Groups and subgroups. Symmetric groups.</li> <li>• Conjugated elements and subgroups.</li> <li>• Group homomorphisms and isomorphisms.</li> <li>• Normal subgroups and factor groups.</li> <li>• Action of a group on a set.</li> <li>• Sylow subgroups, Sylow theorems</li> <li>• Ring, ideal, division ring.</li> <li>• The characteristics of a ring. Finite fields.</li> </ul>		

**Temeljni literatura in viri / Readings:**

W. Y. Gilbert, W. K. Nicholson, Modern Algebra with Applications, Wiley, Chichester 2004  
S. Lang, Undergraduate Algebra, Springer, 2005  
A. I. Kostrikin, Introduction to Algebra, Springer-Verlag, New York 1982



I. Vidav, Algebra, DMFA, Ljubljana 1980

N. Božović, Ž. Mihajlović. Uvod u teoriju grupa. Naučna knjiga, Beograd 1983

**Cilji in kompetence:**

Študentje spoznajo osnove teorije grup in polj, skupaj s spremljajočimi pojmi kot so podstruktura, homomorfizem, kvocientna struktura.

**Objectives and competences:**

The students get familiar with the fundamentals of the theory of groups and fields, including such related topics as substructure, homomorphism and factor structure.

**Predvideni študijski rezultati:**

Znanje in razumevanje:

- Razumevanje temeljnih pojmov algebrske strukture, njene podstrukture in izomorfnih struktur.
- Poznavanje osnovnih značilnosti in tipičnih primerov grup, kolobarjev in polj.

Prenesljive/ključne spretnosti in drugi atributi:

- Algebrske strukture z eno in dvema notranjima binarnima operacijama so osnova za razumevanje sodobne matematike.

**Intended learning outcomes:**

Knowledge and Understanding:

- Understanding the basic notions about an algebraic structure, its substructure and isomorphic structures.
- To recognize the typical properties and main examples of groups, rings and fields.

Transferable/Key Skills and other attributes:

- Algebraic structures with one and two inner binary operations are of principal importance for understanding the modern mathematics.

**Metode poučevanja in učenja:**

- Predavanja
- Seminarske vaje
- Individualno delo

**Learning and teaching methods:**

- Lectures
- Tutorial
- Individual work

**Načini ocenjevanja:****Assessment:**

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

Pisni izpit – praktični del  
Ustni izpit – teoretični del

Pisni izpit – praktični del se lahko nadomesti z dvema delnima testoma (sprotne obveznosti).

Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.

Opravljen pisni del izpita je pogoj za pristop k teoretičnemu delu izpita.

Delež (v %) /  
Weight (in %)

50%  
50%

Type (examination, oral,  
coursework, project):

Written exam – practical part  
Oral exam – theoretical part

Written exam – practical part can be replaced by two partial tests (mid-term testing).

Each of the mentioned commitments must be assessed with a passing grade.

Passing grade of the written exam is required for taking the oral exam.



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

1. BENKOVIČ, Dominik, GRAŠIČ, Mateja. Generalized skew derivations on triangular algebras determined by action on zero products. *Communications in algebra*, ISSN 0092-7872, 2018, vol. 46, iss. 5, str. 1859-1867. <https://doi.org/10.1080/00927872.2017.1360334>, doi: [10.1080/00927872.2017.1360334](https://doi.org/10.1080/00927872.2017.1360334). [COBISS.SI-ID [18505817](https://doi.org/10.1080/00927872.2017.1360334)]
2. GRAŠIČ, Mateja. Zero product determined Jordan algebras, II. *Algebra colloquium*, ISSN 1005-3867, 2015, vol. 22, iss. 1, str. 109-118, doi: [10.1142/S1005386715000103](https://doi.org/10.1142/S1005386715000103). [COBISS.SI-ID [21136136](https://doi.org/10.1142/S1005386715000103)]
3. BENKOVIČ, Dominik, GRAŠIČ, Mateja. Generalized derivations on unital algebras determined by action on zero products. *Linear Algebra and its Applications*, ISSN 0024-3795. [Print ed.], 2014, vol. 445, str. 347-368. <http://dx.doi.org/10.1016/j.laa.2013.12.010>. [COBISS.SI-ID [20314120](https://doi.org/10.1016/j.laa.2013.12.010)]
4. BIERWIRTH, Hannes, BREŠAR, Matej, GRAŠIČ, Mateja. On maps determined by zero products. *Communications in algebra*, ISSN 0092-7872, 2012, vol. 40, no. 6, str. 2081-2090. <http://dx.doi.org/10.1080/00927872.2011.570833>. [COBISS.SI-ID [16315481](https://doi.org/10.1080/00927872.2011.570833)]
5. GRAŠIČ, Mateja. Zero product determined Jordan algebras, I. *Linear and Multilinear Algebra*, ISSN 0308-1087, 2011, vol. 59, no. 6, str. 671-685. <http://dx.doi.org/10.1080/03081087.2010.485199>. [COBISS.SI-ID [15927641](https://doi.org/10.1080/03081087.2010.485199)]