



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>	<b>Selected Topics in Algebra</b>

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna matematika – enopredmetna, 2. Stopnja		1. ali 2.	1. ali 3.
Educational mathematics - single-major, 2 <sup>nd</sup> cycle		1. or 2.	1. or 3.

**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:**

**Jeziki / Languages:**

<b>Predavanja / Lectures:</b>	SLOVENSKO/SLOVENE
<b>Vaje / Tutorial:</b>	SLOVENSKO/SLOVENE

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

**Prerequisites:**

Poznavanje osnov teorije grup in teorije kolobarjev.

Knowledge of basic group theory and basic ring theory.

**Vsebina:**

**Content (Syllabus outline):**

Galoisova teorija: osnovni izrek Galoisove teorije, rešljivost polinomskih enačb z radikali, osnovni izrek algebre.

Galois Theory: Fundamental Theorem of Galois Theory, solvability of polynomial equations by radicals, Fundamental Theorem of Algebra.

Moduli: osnovni pojmi in primeri, posebni razredi modulov (prosti, projektivni, enostavni itd.), moduli nad glavnimi kolobarji.

Modules: basic concepts and examples, special classes of modules (free, projective, simple, etc.), modules over principal ideal domains.

Tenzorski produkti vektorskih prostorov, modulov in algeber.

Tensor products of vector spaces, modules and algebras.

### Temeljni literatura in viri / Readings:

M. Brešar, Introduction to Noncommutative Algebra, Springer, 2014.  
M. Brešar, Undergraduate Algebra. A Unified Approach, Springer, 2019.  
M. Brešar, Uvod v algebro, DMFA, 2018.  
D. Dummit, R. Foote, Abstract Algebra, Prentice-Hall, 1991.  
T. W. Hungerford, Algebra, Springer-Verlag, 1980.

### Cilji in kompetence:

Poglobiti znanje osnovnih področij abstraktne algebre.

### Objectives and competences:

Deepening the knowledge of fundamental areas of abstract algebra.

### Predvideni študijski rezultati:

Znanje in razumevanje:

Po zaključku predmeta bo študent seznanjen s klasično abstraktno algebro in s tem pripravljen na študij njenih modernih vsebin.

Prenosljive/ključne spretnosti in drugi atributi:

Algebraične strukture so pojavljajo na vseh matematičnih področjih, zato mora biti z njimi seznanjen vsak matematik.

### Intended learning outcomes:

Knowledge and Understanding:

On the completion of the course, the student will be acquainted with the classical abstract algebra and capable of tackling its modern areas.

Transferable/Key Skills and other attributes:

Algebraic structures occur in all mathematical areas, so their knowledge is a necessity for every mathematician.

### Metode poučevanja in učenja:

- Predavanja
- Seminarske vaje

### Learning and teaching methods:

- Lectures
- Tutorial

### Načini ocenjevanja:

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

Pisni izpit

Ustni izpit

Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.

Delež (v %) /  
Weight (in %)

50%

50%

### Assessment:

Type (examination, oral, coursework, project):

Written exam

Oral exam

A passing grade is required for each of the two exams.

Opravljen pisni izpit – problemi je pogoj  
za pristop k ustnemu izpitu – teorija.

Passing the written test is required for  
taking the oral exam.

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

1. BREŠAR, Matej. *Undergraduate algebra : a unified approach*, (Springer undergraduate mathematics series). Cham: Springer, cop. 2019. XXIV, 2116 str. ISBN 978-3-030-14052-6. ISBN 978-3-030-14053-3.
2. ALAMINOS, J., BREŠAR, Matej, EXTREMERA, J., VILLENA, A. R. Zero Lie product determined Banach algebras, II. *Journal of mathematical analysis and applications*, ISSN 0022-247X. [Print ed.], June 2019, vol. 474, iss. 2, str. 1498-1511.
3. BREŠAR, Matej, ŠEMRL, Peter. Continuous commuting functions on matrix algebras. *Linear Algebra and its Applications*, ISSN 0024-3795. [Print ed.], May 2019, vol. 568, str. 29-38.
4. BREŠAR, Matej, HANSELKA, Christoph, KLEP, Igor, VOLČIČ, Jurij. Skolem-Noether algebras. *Journal of algebra*, ISSN 0021-8693, March 2018, vol. 498, str. 294-314..
5. BREŠAR, Matej, ZHAO, Kaiming. Biderivations and commuting linear maps on Lie algebras. *Journal of Lie theory*, ISSN 0949-5932, 2018, vol. 28, no. 3, str. 885-900.