UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	**Algebra II**
Course title:	Algebra II

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 1. stopnja		**2.**	**4..**
Mathematics, 1st cycle		**2.**	**4.**

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
45		**30**			**135**	**7**

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:	**Prerequisits:**
Znanje predmeta Algebra 1.	Knowledge from the Algebra 1 course.

Vsebina:	**Content (Syllabus outline):**
<u>Končne grupe: delovanja grup, Cauchyjev izrek in izreki Sylowa, končne Abelove grupe.</u> Kolobarji polinomov, nerazcepni polinomi. Deljivost v komutativnih kolobarjih. Evklidski in glavni kolobarji. Kolobarji z enolično faktorizacijo.Polja: algebrični in transcendentni elementi, končne razširitve, konstrukcije z ravnilom in šestilom, razpadna polja in algebraično zaprta polja, končna polja, uvod v Galoisovo teorijo.	Finite groups: group action, Cauchy's theorem and Sylow theorems, finite Abelian groups. Polynomial rings, irreducible polynomials. Divisibility in commutative rings. Euclidean rings and principal ideal domains. Unique factorization domains. Fields: algebraic and transcendental elements, finite extensions, straightedge and compass constructions, splitting fields and algebraically

	closed fields, finite fields, introduction to Galois theory.

Temeljni 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:**
Študent spozna pojme iz algebre, ki jih potrebuje pri nadaljnjem študiju matematike. Ob tem se uči abstraktnega načina razmišljanja.	Students learn concepts of algebra that are needed for further study of mathematics. Through this, they also learn abstract thinking.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: - Študent pozna in zmore pojasniti osnove teorije končnih grup. - Študent pozna in zmore pojasniti osnove teorije komutativnih kolobarjev. - Študent pozna in zmore pojasniti osnove teorije razširitev polj. Prenesljive/ključne spretnosti in drugi atributi: Pridobljena znanja so podlaga za več predmetov na drugi stopnji.	Knowledge and Understanding: - The knowledge of and ability to explain the basic finite group theory. - The knowledge of and ability to explain the basic commutative ring theory. - The knowledge of and ability to explain the basic theory of field extensions. Transferable/Key Skills and other attributes: The obtained knowledge is a prerequisite for several courses at the second cycle level.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Teoretične vaje	• Lectures • Theoretical exercises

Načini ocenjevanja: **Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):	Delež (v %) / Weight (in %)	Type (examination, oral, coursework, project):
Pisni izpit – problemi Ustni izpit – teorija Pisni izpit se lahko nadomesti z vsaj dvema delnima testoma (sprotne obveznosti).	50% 50%	Written exam – problems Oral exam – theoretical part Written exam can be replaced by two or more partial tests (mid-term testing).

Oba izpita, pisni in ustni, morata biti opravljena s pozitivno oceno. Opravljen pisni izpit je pogoj za pristop k ustnemu izpitu.	Each of the two exams, oral and written, must be assessed with a passing grade. Passing the written exam is a prerequisite for taking the oral exam.

Reference nosilca / Lecturer's references:

1. BREŠAR, Matej. *Zero product determined algebras*. Cham: Birkhäuser: Springer, cop. 2021. VIII, 185 str. Frontiers in mathematics.
2. BREŠAR, Matej. Automorphisms and derivations of finite-dimensional algebras. *Journal of algebra*. June 2022, vol. 599, str. 104-121.
3. BREŠAR, Matej, GODOY, María Luisa Castillo, VILLENA, A. R. Maps preserving two-sided zero products on Banach algebras. *Journal of mathematical analysis and applications*. [Print ed.]. Nov. 2022, vol. 515, iss. 1, art. 126372 (16 str.).
4. BAJUK, Žan, BREŠAR, Matej. Two-sided zero product determined algebras. *Linear algebra and its applications*. [Print ed.]. June 2022, vol. 643, str. 125-136.
5. BREŠAR, Matej, ŠEMRL, Peter. The Waring problem for matrix algebras. *Israel journal of mathematics*. Mar. 2023, vol. 253, iss. 1, str. 381-405.