Study programme(s): Mathematics (M3)

Level: bachelor

Course title: Algebra 2 (M3-06)

Lecturer: Andreja P. Tepavčević, Petar Dj. Djapić

Status: obligatory

ECTS: 8

Requirements: none

Learning objectives

Knowing the basic algebraic structures and laws through a detailed systematization of the structures of numbers and polynomials. Introduction to the techniques related to number theory and polynomials. Developing the skill of mathematical abstraction.

Learning outcomes

Minimal:

Knowing and understanding of basic algebraic structures and gaining skills of solving simple problems. Analysing the structures and properties of numbers. Solving problems by mathematical induction, solving systems of Diophantine and congruence equations, finding zeros of polynomials.

Desirable: Understanding general properties of the algebraic structures, numbers, polynomials, matrices, and recognizing these in other areas of mathematics and applications. Recognizing algebraic laws, structures and their properties in different mathematical areas.

Syllabi

Theoretical lessons

Notion of operation and algebraic structures. Groupoids, subgroupoids, direct products, and homomorphisms. Groups and their basics properties. Normal subgroups, and homomorphisms. Rings, integral domains and fields. Homomorphisms and ideals of rings. Vector spaces. Axiomatic foundation and structure of natural numbers, integers, rational, real and complex numbers. Order. Basic number theory: divisibility and congruences in the ring of integers. GCD, LCM, prime numbers, Euclidean algorithm, the Chinese Remainder Theorem, Diophantine equations, Fermat's little theorem, Euler and Wilson's theorem. Polynomials. roots of polynomials, irreducible polynomials, basic theorem of algebra. Vieta's formulas.

Practical lessons

Work on concrete examples and solving problems in algebraic structures, identifying substructures, congruences. Using elements of number theory to solve various problems. Solving Diophantine and congruence equations. Procedures for determining roots of polynomials and solving typical problems that use numbers and polynomials.

Literature

1. B. Šešelja, A. Tepavčević, Algebra 2, teorija i zadaci, Symbol, Novi Sad, 2011.

Weekly teaching load				Other: 0
Lectures: 3	Exercises: 3	Other forms of teaching: 0	Student research: 0	

Teaching methodology

Lectures are presented using classical teaching methods and supported by beamer presentations. Exercises are aimed to practise and analyse typical problems and techniques of their solutions.

Grading (maximum number of points 100)

Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	50	Oral exam	50