

Study programme(s): Applied Mathematics (MAP)		
Course title: ALGEBRAIC STRUCTURES AND APPLICATIONS (P113)		
Lecturer(s): Madaras Rozalija, Igor Dolinka, Petar Marković		
Course status: elective		
ECTS points: 5		
Requirements:		
Learning Objectives Introduction and acquisition of basic knowledge from Group Theory, Ring Theory and Field Theory; introduction to algorithmic problems in algebra and applications of algebraic structures in science and engineering.		
Learning Outcomes <i>Minimal:</i> Familiarity and understanding of basic algebraic structures such as groups, rings, fields. <i>Desirable:</i> Noticing the general characteristics of algebraic structures such as groups, rings and fields, understanding the proofs of fundamental theorems in these areas, and their importance in applications in other areas of mathematics and other scientific fields, with an emphasis on algorithmic problems.		
Syllabus <i>Theoretical instructions</i> Definition and examples of groups. Cyclical groups, permutation groups, isomorphism, homomorphism, subgroups, and cosets. Normal subgroups and factor groups. Fundamental homomorphism theorem. Lagrange's and Cayley's theorem. Direct product of groups. Discrete logarithms. Symmetrical groups in crystallography, cryptography. Definition and examples of rings. Integral domains, ideals, and factor rings. The ring of polynomials. The notion of fields and their basic characteristics. Finite fields and the arithmetic of finite fields. <i>Practical instructions</i> Solving and understanding of conveniently selected exercises that illustrate abstract notions and theorems from theoretical instructions on some concrete examples.		
Literature 1. S. Crvenković, I. Dolinka, R. S. Madaras, Odabrane teme opšte algebre , PMF u Novom Sadu, 1998. 2. B. Šešelja, A. Tepavčević, Algebra 2, teorija i zadaci , Symbol, Novi Sad, 2011. 3. M. Grulović, Osnovi teorije grupa , Institut za matematiku, Novi Sad, 1997. 4. Ž. Mijajlović, Predavanja iz algebre II , elektronsko izdanje 5. D. S. Dummit, R. M. Foote, Abstract Algebra , Third Edition, Wiley & Sons, 2003.		
Number of active classes	Lectures: 2	Exercises: 2
Teaching methods Teaching is performed by classical methods, as well as by interacting with students present. In the exercises typical problems are solved that contribute to an understanding of these areas and gaining practical techniques for solving them.		

The examination of the adopted knowledge is conducted via one colloquium. In the oral part of the exam, the student demonstrates a comprehensive understanding of the exposed material.

Grading (maximum number of points 100)

Pre-exam obligations	Points	Final exam	Points
Colloquium	50	Oral exam	50