Study programmes: Bachelor studies – Mathematics

Course name: Algebra 3

Lecturers: Žarko Mijajlović, Gojko Kalajdžić, Aleksandar Lipkovski, Dragana Todorić, Zoran Petrović

Status: Compulsory

ECTS: 5

Attendance prerequisites: Linear Algebra, Algebra 1, Algebra 2

Course aims: Acquisition of general and specific knowledge in higher algebra

Course outcome: Upon completion of the course, the students have advanced knowledge in Algebra, in particular in Galois theory. The students understand the following concepts: algebraic field extension, normal towers of subgroups, Galois groups, solvability of algebraic equations in radicals. The students know fundamental theorems of Galois theory and main algebraic constructions in field theory. They are able to solve problems in the field, and to attend advanced courses in algebra and in other areas in which algebra is applied.

Course content:

Fields. Simple extensions, algebraic and transcendent. Constructible numbers. Splitting fields (existence and uniqueness up to isomorphism). Finite Galois extensions. Algebraically closed fields. The field of algebraic numbers.

Groups. Isomorphism theorems (I, II, III). Normal towers. Jordan-Holder theorem. Solvable groups. Simple groups, groups S_n and A_n.

Galois Theory. Group of automorphisms of field over subfield. Separability. Primitive element theorem. Separable degree. Normal extensions. Galois extensions. Galois groups. Fundamental theorem of Galois theory. Applications: calculations of Galois groups, cyclotomic polynomials, Gauss theorem on regular polygons, Fundamental theorem of algebra. Radical extensions. Solvability of algebraic equations in radicals.

Applications. Algebraic number theory

Literature:

1. G. Kalajdžić, *Algebra*, Faculty of Mathematics, Belgrade 1998.
2. Ž. Mijajlović, *Algebra*, Milgor, Belgrade, 1998.
3. N. Božović, Ž. Mijajlović, *Uvod u teoriju grupa*, Naučna knjiga, Beograd
4. A. Clark, *Elements of Abstract algebra*, Dover Publ. Co. New York, 1984;
5. A. Baker, *A concise introduction to the theory of numbers*, Cambridge Univ. Press, 1984.
6. S. Lang, *Algebra*, Addison-Wesley Publ. Co, New York 1984.

Number of hours: 4	**Lecures: 2**	**Tutorials: 2**	**Laboratory: -**	**Research: -**

Teaching and learning methods: Lectures/ Tutorials

Assessment (maximal 100 points)

Course assignments	**points**	**Final exam**	**points**
Lectures	-	Written exam	30
Exercises / Tutorials	-	Oral exam	40
Colloquia	20	Written-oral exam	-
Essay / Project	10		