Study programmes: PhD – Mathematics

Course name: Algebra 4

Lecturers: Aleksandar Lipkovski, Zoran Petrović

Status: Optional (compulsory for students in Algebra)

ECTS: 9

Attendance prerequisites: no prerequisite

Course aims: Acquisition of advanced knowledge in algebra.

Course outcome: Upon completion of the course, the students enlarged their knowledge in theory of algebraic equations and linear algebra, and acquired basic knowledge in representation theory and homological algebra. The students understand the following concepts: algebraic extension, transcendental extension, Noetherian rings and modules, semisimple rings and modules, representations of finite groups, free resolutions. The students know fundamental theorems and main constructions in these areas. They are able to solve problems in the field, and to attend more advanced courses in algebra and related areas in which algebra is applied.

Course content:

Algebraic equations: Algebraic extensions. Galois theory. Ring extensions. Noetherian rings and modules. Real fields. Absolute values.

Linear algebras and representations. Representation of one endomorphism. Bilinear forms. Tensor product. Semisimple rings and modules.

Optional part. Representations of finite groups. Homological algebra. General homology theory. Finite free resolutions.

Literature:

1. **G. Kalajdžić, *Algebra***, Matematički fakultet, Beograd, 1998.
2. **T. Hungerford, *Algebra*** (Graduate Texts in Mathematics) Springer; 1st ed. 1974. Corr. 5th printing edition (February 14, 2003).
3. **S. Lang, *Algebra***, Addison-Wesley Publ. Co, New York 1984.

Number of hours: 10	**Lecures: 4**	**Tutorials: -**	**Laboratory: -**	**Research: 6**

Teaching and learning methods: Lectures/ Tutorials

Assessment (maximal 100 points)

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