Course: Ordered algebraic structures	
Course instructors: Jelena M. Ignjatović, Zorana Z. Jančić	
Course type: Elective	
Credit points ECTS: 12	
Prerequisites: No	

Course objectives:

Acquiring knowledge about various ordered algebraic structures and residuated structures, about their basic applications, and about multi-valued logics based on these structures .

Learning outcomes:

Upon completion of the course, the student should master the basic ideas, concepts and results in the field of ordered algebraic structures, and be able to apply these ideas, concepts and results independently in scientific research.

Course description (outline):

Ordered semigroups, lattice-ordered semigroups, natural ordering on a semigroup, ordered semirings, natural ordering on a semiring, dioids, quantales, additively idempotent semirings (path algebras), inclines, residuated algebraic structures, residuated semigroups, residuated semirings, residuated semimodules, residuated lattices, BL-algebras, Heyting algebras, MV-algebras, Gödel algebras, triangular norms on a real unit interval, basic fuzzy structures, fuzzy logic, max-plus, min-plus and max-min algebras.

References:

6. T. S. Blyth, Lattices and Ordered Algebraic Structures, Springer, London, 2005.
7. M. Gondran, M. Minoux, Graphs, Dioids and Semirings – New Models and Algorithms, Springer, Berlin, 2008.
8. G. Birkhoff, Lattice Theory, third ed., American Mathematical Society, Providence, RI, 1973..
9. N. Galatos, P. Jipsen, T. Kowalski, H. Ono, Residuated Lattices - An Algebraic Glimpse at Substructural Logics, Elsevier, 2007.
10. R. Belohlavek, V. Vychodil, Fuzzy Equational Logic, Springer, Berlin-Heidelberg, 2005.
11. R. Belohlávek, Fuzzy Relational Systems: Foundations and Principles, Kluwer Academic Publishers, New York, 2002.

Active teaching hours: 5	Theoretical classes: 5	Practice classes:

Methods of teaching:

The lectures use classical teaching methods with the use of modern information and communication technologies and interaction with students. Students' knowledge is tested through homework and defense of seminar papers. The final oral exam checks the comprehensive understanding of the presented material.

Grading structure (100 points)

Activity during the lectures: *10 points*; homework and seminars: *20 points*; oral exam: *70 points*.