Course: Semiring theory
Course instructors: Nada Ž. Damljanović, Aleksandar B. Stamenković
Course type: Elective
Credit points ECTS: 12
Prerequisites: No
Course objectives: *Introduction to the basic ideas, concepts and results of semiring theory, as well as introduction to the applications of semi-rings.*
Learning outcomes: *Upon completion of the course, the student should master the basic ideas, concepts and results of semiring theory, and be able to apply these ideas, concepts and results independently in scientific research within the same or another scientific field.*
Course description (outline):   *Semirings, ordered semirings, complete semirings, star operation, continuous semirings, power series over semirings, rational power series, semimodules, residuated semirings and semimodules, diodes, anti-rings, additively idempotent semirings, inclines, max-plus, min-plus and max-min algebras, matrix calculus over semirings, transitive closures, linear dependence and independence in semimodules, eigenvectors and subeigenvectors, solving systems of linear equations and inequations, solving matrix inequations and equations over diodes, max-plus, min-plus and max-min algebras, applications in optimiza-tion, data analysis and other fields, diodes and nonlinear analysis.*

References:
12. J. Golan, Semirings and Their Applications. Kluwer Academic, Dordrecht, 1999.
13. M. Gondran, M. Minoux, Graphs, Dioids and Semirings – New Models and Algorithms, Springer, Berlin, 2008.
14. P. Butkovič, Max-linear Systems: Theory and Algorithms, Springer, London, 2010.
15. B. Heidergott, G.J. Olsder, J. van der Woude, Max Plus at Work: Modeling and Analysis of Synchronized Systems: A Course on Max-Plus Algebra, Princeton University Press, Princeton, 2006.
16. Z. Q. Cao, K. H. Kim, F. W. Roush, Incline Algebra and Applications, John Wiley, New York, 1984.
17. J. Gunawardena, Idempotency, Cambridge University Press, 1998.

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*.