

Course title: LINEAR PROGRAMMING AND OPTIMIZATION
Teacher or teachers: Stanimirović P. Ivan
course status: elective
Credit points ECTS: 12
Prerequisites:
The aim of the course Mastering the knowledge of the use of quantitative methods and optimization algorithms in decision-making in the management process.
Outcome of the course By taking the exam, the student is introduced to the basic concepts and methods of mathematical statistics, principles and methods of optimization that are used to solve management problems; understand that the solutions obtained by mathematical modeling are less burdened than the subjective attitudes of decision makers.
Course content Theoretical classes: Basic concepts of probability theory and statistics. The decision tree. Sampling, interval estimates and confidence intervals for large and small samples. Determining the confidence interval for the difference, ie the ratio of the considered statistical parameters (arithmetic mean, proportion and variance of the population) of the two populations in the case of small and large samples. Testing of parametric and nonparametric hypotheses. Regression and correlation analysis, application in trend analysis. Systems theory and systems analysis. Introduction to optimization. Mathematical modeling: identification and approximation. Examples of mathematical modeling (mathematical model of the accumulation core, etc.). One-criteria optimization: definition of the optimization task and optimal solution. An overview of optimization methods. Optimization of stochastic systems. Example of accumulation sizing. Linear programming (geometric method, simplex method, dual linear programming problem, sensitivity analysis of the obtained solution). Transport problem (closed and open transport task). Scheduling task. Nonlinear programming (unconditional optimization and reduction method). Network planning methods (CPM, PERT and PERT-COST methods). Multicriteria optimization: problem setting. Methods for determining non-inferior solutions (method of weighting coefficients, method of constraints in the space of criterion functions, multicriteria simplex method). Targeted programming. Interactive methods (STEM and SEMPOPS methods). Stochastic methods (PROTRADE method). Inventory management (basic concepts in inventory management, ABC analysis, deterministic inventory models). Practical teaching: Creating assignments that belong to the topic covered in lectures. Illustrative data predominate in the assignments and the goal is for the student to master the processed methods. Practical training of students to use computers in management tasks using available software for all areas studied in this course: software for statistical analysis of problems (Excel, and other software available on the Internet), software for linear programming.
Recommended literature 1. I. Stanimirović, Advances in Optimization and Linear Programming, 2021, Apple Academic Press Incorporated, Taylor & Francis. 2. Simonović, V., Tadić, D., Milanović, D., Quantitative methods, ICIM plus, Kruševac, 2005. 3. Jovanović, T., Quantitative methods, Faculty of Mechanical Engineering, Belgrade, 1996. 4. Jovanović, T., et al., Zbirka zadataka iz kvantitativnih metoda, Mašinski fakultet, Beograd, 1996. 5. Tadić, D., Theory of assembly phases-application in solving management problems, Faculty of Mechanical Engineering, University of Kragujevac, Kragujevac, 2006.
Knowledge assessment (maximum number of points 100)
Pre-examination obligations: homework (10 points), seminar paper (30 points), oral exam: 60 points