Instructor

Vladimir Gurvich

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Teaching Assistant

Vladimir Oudalov

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Course description

Linear Optimization, also called Linear Programming (LP), is a mathematical
theory for finding the most efficient allocation of resources in problems of economics, industry, engineering etc. Mathematically, LP concerns the maximization or
minimization of a linear function subject to a system of linear constraints.

In this course, students will learn in particular

- how to formulate real-world problems as linear programs,
- how to compute the optimal solution of a linear program;
- the mathematical structure underlying LP;
- duality theory,
- basic applications of LP;
Course goals
The goal of the course is to develop proficiency in
- formulating real-world problems as linear programs;
- solving linear programs;
- the mathematics of LP in terms of its algebraic and geometric interpretations, and duality theory;
- understanding the applications and limitations of LP.

Textbook
Bernard Kolmar and Robert E. Beck,
Elementary linear programming and applications

Syllabus
- Review of Linear Algebra: Matrices, Linear Spaces and Subspaces, linear Independence and basis;
- Linear Programming Problems: Examples, Geometry of Linear Programming, Matrix Notation, the Extreme Point Theorem;
- The Simplex Method: Degenerasy, Cycling and Initialization; Artificial Variables;
- Duality Theory; Computational Relations between the Primal and Dual Problems; Matrix Games and the Minimax Theorem;
- Special Types of Linear Programming Problems: the Transportation Problem, the Assignment Problem, the Maximal Flow Problem, The Shortest Route Problem.

Lectures, time and location
MW7, 6:10 – 7:30 pm, FH-A6 CAC

Prerequisites
Math 640:250 Linear Algebra

Grading
Final grades computed as: 30% homeworks, 30% midterm exam, 40% final exam

Homework
There will be 5-7 homework assignments during the semester. Homework problems will be assigned at the end of each chapter and they will be collected in 1 or 2
weeks at the beginning of class. If you cannot come to class on the day an assignment is due, you may leave the assignment in my mail box at RUTCOR anytime before this day.

Exams

• There will be two midterm exams: the last class before and the first class after Spring Break: [both at standard time and place]. Students are encouraged to take both midterms, in this case the score will be the maximum of the two.
• The final exam will be scheduled by Math. Dep.
• No further make-up exams will be administrated.