

SYLLABUS

SIE 544: Linear Programming, Fall 2014

Instructor: Ruiwei Jiang
Contact: ruiweijiang@email.arizona.edu, ENGR 310.
Office hours: Monday and Wednesday, 4:00pm–6:15pm in ENGR 310.
Lecture: Monday and Wednesday, 4:30pm–5:45pm in Chavez 316.

Textbooks.

- ◇ Required: D. Bertsimas and J. N. Tsitsiklis, **Introduction to Linear Optimization**, Athena Scientific.
- ◇ Reference: R. L. Rardin, **Optimization in Operations Research**, Prentice Hall.

Prerequisites. Linear algebra (matrix analysis, row/column operations, solution methods for linear equation systems). Basic computational coding skills (e.g., Excel VBA, Matlab, etc).

Course Description.

- ◇ SIE 544 is a graduate-level course that discusses *basic* Linear Programming (LP) models, applications, and solution methods. We will cover topics of mathematical modeling, the Simplex method, duality theory, sensitivity analysis, network flow problems and fundamental results. We will focus on formulating mathematical models to represent real-world problems and on developing methods to identify optimal solutions to these models. By introducing a few handy modeling and computation tools and software (e.g., Excel Solver, AMPL, and Matlab), we expect that you all learn how to efficiently model and solve optimization problems in practice.

Expectation. After one-semester studies, students are expected to

- ◇ Identify decision variables, problem parameters, objectives, and constraints in practical optimization problems.
- ◇ Formulate a range of practical optimization problems as LP models, including problems in finance industry, network flow, supply chain management, healthcare, telecommunication, etc.
- ◇ Apply the Simplex method and other traditional techniques to solve LPs.
- ◇ Analyze solution sensitivity of an LP to its problem parameters.
- ◇ Formulate and solve a variety of problems in computational software, report optimal solutions, and conduct sensitivity analysis.
- ◇ Identify and develop network structures for a variety of real-world problems.

Homework.

- ◇ There are 5–6 homework assignments planned. Homework questions will include modeling, numerical analysis, algorithm design, and computational software programming tasks.

Resources.

- ◇ All announcements and course materials (e.g., slides and handouts) will be posted on D2L. Please check updates responsively and use them responsibly.
- ◇ The homework will include several basic coding tasks. Please attend lectures to learn about how we can use Excel Solver, AMPL, and Matlab to solve LP problems. Online tutorials and resources will also be provided to facilitate future reference.

Exams.

- ◇ We have one midterm (or course project) and one final.
- ◇ Students are allowed to bring pens, basic calculators, and a two-sided formula sheet to the exams.
- ◇ Exams will be conducted under the UA Honor Code.

Final Grades. Homework 30% + Midterm (or Course Project) 30% + Final 40%.