



LINEAR PROGRAMMING

A Graduate Level Course

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Outline

- Course objective
- Pre-requisites
- Course content
- Grading and Exams
- Classroom rules
- Textbook and references

Course objective

- This is a course that provides the fundamental understanding to the **theory and algorithms** of linear optimization.
- It involves **mathematical analysis, theorem proving, algorithm design and numerical methods**.
- It is also a preparatory course for IE/OR students to take their **PhD Qualifying Exam** on this subject.

Important to know

- This course does **NOT** tell you how to build linear programming **models**.
- This course does **NOT** tell you how to use Excel Spreadsheets, SAS OPT, MATLAB, LINGO, CPLEX, or any **solver**.

Prerequisites

1. Matrix Theory
2. Linear Algebra
3. Introduction to OR

Homework #1 tells you something.

Course contents

1. Introduction to LP
2. Geometric Interpretation of LP
3. Simplex Method
4. Duality and Sensitivity Analysis
5. Interior Point Method
6. Related Topics

Grading and standard

1. Homework - 20%
2. Two Midterms - 50%
3. Final - 30%

A - 88 and above

B - 75 to 87

C - 60 to 74

Fail - under 60

Exams

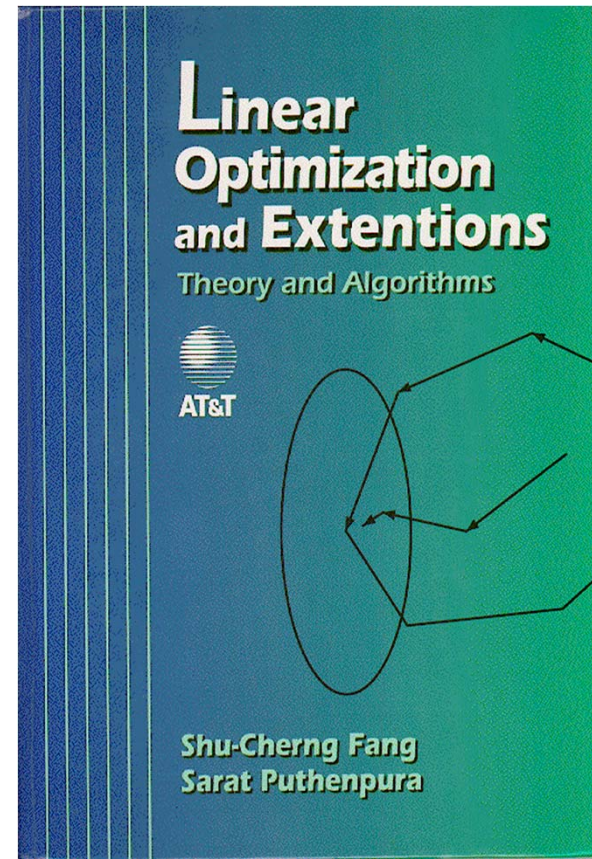
- **First Midterm:** Up to the Simplex Method, closed book exam.
- **Second Midterm:** Up to Duality and Sensitivity, closed book exam with one 4x6 index card.
- **Final:** Comprehensive with emphasis on the Interior Point Methods, open book exam.

Classroom rules

- Rule 1: No late homework without TA's approval
- Rule 2: Convince TA for any grade changes.
- Rule 3: No make-up exam without my pre-approval or "doctor notes" from hospital.

Textbook

- Shu-Cherng Fang and Sarat Puthenpura,
“Linear Optimization and
Extensions: Theory and
Algorithms.”
Prentice Hall 1993.



References

1. G. Dantzig, "Linear Programming and Extensions" (QA265 G3 1963)
2. V. Chvatal, "Linear Programming" (T57.74 C54 1983)
3. K. Murty, "Linear Programming" (T57.74 M87 1983)
4. D. G. Luenberger, "Linear and Nonlinear Programming" (T57.7 L8 1984)
5. S. I. Gass, "Linear Programming" (T57.74 G3 1985)
6. K. Murty, "Linear and Combinatorial Programming" (T57.74 M87 1985)
7. M. S. Bazaraa, "Linear Programming and Network Flows" (T57.74 B39 1990)

References

8. A. George, J. W. Liu, "Computer Solutions for Large Sparse Definite Systems" (QA188 G46 1981)
9. G. H. Golub, C. F. Van Loan, "Matrix Computations" (QA188 G65 1983)
10. N. Meggido, "Progress in Mathematical Programming" (QA402.5 P785 1989)
11. R. Saigal, "Linear Programming" (T57.74 S23 1995)
12. G. Dantzig, M. Thapa, "Linear Programming" (T57.74.D365 1997)
13. D. Bertsimas, J. Tsitsiklis. "Introduction to Linear Optimization" (1997)
14. R. Vanderbei, "Linear Programming: Foundations and Extensions" (T57.74.V36 2008)