

**DEPARTMENT OF MATHEMATICS
SYLLABUS**

Course # & Name: MAT 168: Mathematical Programming

Recommended Text(s) & Price: Linear Programming: Foundations and Extensions, second edition, R.J. Vanderbei, KluwerAcad.Publ., Boston, 2001, price: \$80

Prepared by: Roger Wets, Jim Diederich, Thomas Strohmer

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Lecture(s)	Sections	Comments/Topics
1. week	Chapter 1 (*)	Modelization: examples, equivalence between various formulation (includes introduction to modeling languages)
2.-3. week	Chapter 2 Chapter 4 Chapter 6	The simplex method: pivoting, finite termination. Applications: Inventory, Manufacturing, Curve Fitting. Transportation problems: special version of the simplex method (includes setting up individual work projects)
4. week	Chapter 5 Chapter 9	Duality for linear programs. Interpretation of dual problem, variables.
5. week	Chapter 7	Sensitivity analysis with respect to the resource vector, cost
6. week	Chapter 3	The geometry of linear programs: polyhedral convexity
7.-8. week	Chapter 16 Chapter 17	Interior point methods; Optimality conditions, the Newton-Raphson method for systems of

		(nonlinear) equations, primal-dual interior point method.
9.-10. week	Chapter 13 Chapter 14	Network flow problems: min-flow/max-cut theorem, algorithmic procedures for solving network flow problems. Applications to communication, distribution, project scheduling

Additional Notes:

(*) Chapter 1 does not contain many examples, most examples appear in other chapters in the book and may be mentioned briefly in the introduction. In general, reference to chapters is only approximate, since certain topics are spread throughout the book.

In addition, the students will receive an introduction to modeling languages such as AMPL or GAMMS. Matlab might also be used to illustrate certain numerical procedures and designing some applications.