Course Outline — SPRING 2006

MATH 588: OPTIMIZATION IN NETWORKS

Section G1: 3:00-3:50pm MWF, 147 Altgeld Hall

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Office Hours: MWF 1:30-2:30pm

TOPICS: This is a rigorous introduction to linear programming, network flows and related topics of combinatorial optimization. There is some overlap with Math 482 and Math 412, but the basic material from these classes will be presented more quickly and concisely. Network flow theory is a subject that lies at the cusp among several fields of inquiry, including applied mathematics, engineering, and management.

The topics are selected from:
- Simplex algorithm: Geometry of Linear Programs, Interpretation of the Dual Simplex Algorithm, Computational Aspects, Dantzig-Wolfe Decomposition, the Ellipsoid Algorithm.
- Minimum Spanning Trees: Greedy Algorithm, Kruskal’s, Prim’s and Sollins’s Algorithms, Relation between Spanning Trees and Matroids.
- Matchings and Matroids: Intersection of two Matroids, Matroid Intersection Algorithm, Matroid Matching/Parity, Relations between Matroids and Linear Programming.
- Branch-and-Bound and Dynamic Programming: Integer Linear Programming, Application to a Flowshop Scheduling Problem.


REQUIREMENTS: There are (about n) 6 homework assignments, each worth 100 points, and the best 5 out of (n – 1) count, so the maximum possible score is 500. A typical homework assignment consists of 6 exercises, counting the best 5, each worth 20 points.

Make up possibilities: to type in “proper way” some selected homework. Must consult with the instructor. There are no exams.
The gradings: 80% – : A, 75%– : A-, 70%– : B+, 65%– : 60%– : B, etc.

RESOURCES: Electronic mail is a medium for announcements and questions.
PREREQUISITES: There are no official prerequisites, but students need the mathematical maturity and background for graduate-level mathematics. For example, basics of linear algebra and graph theory are assumed to be known.