IOE 614 Syllabus

Instructor: Professor Katta G. Murty, 2773 IOE Bldg., 763-3513, katta_murty@umich.edu, **Office Hours:** Mon, Wed 10:30 to Noon, and by appointment.

Prerequisites: A course in linear programming (IOE 510 or equivalent).

Background Required: Linear programming, simplex method, polyhedral geometry associated with linear programming.

Course objectives: To provide the 2nd-year graduate student with a basic understanding of integer programming and combinatorial optimization, their importance, and applications. To discuss algorithms for handling integer and combinatorial optimization, and how to use them intelligently.

Text: G. L. Nemhauser and L. A. Wolsey, Integer and Combinatorial Optimization , Wiley, Paperback version available.
Reference Books K. G. Murty, Operations Research: Deterministic Optimization Models, Prentice Hall, 1995.

R. Fourer, D. M. Gay, and B. W. Kernighan, AMPL: A Modeling Language for Mathematical Programming, Scientific Press, 1993.

A. Schrijver, Theory of Linear and Integer Programming, Wiley-Interscience, 1986.

Transparencies: The course will be taught using overhead transparencies. Registered students will have access to these transparencies through the WWW at the address:
http://www-personal.engin.umich.edu/~murty/614

Course Content

1. History of integer programming.

2. A variety of applications, formulation problems.

3. Linear programs with integer optimum solutions, total unimodularity (TU) and unimodularity (U).

4. Computational complexity

5. IPs solvable directly through LP relaxation.

6. The branch and bound approach.

7. Cutting planes and the integer hull of a polyhedron, Valid inequalities and facets, optimization and separation.

8. The polyhedral approach, matching and edge covering problems.

9. Heuristic approaches to large scale combinatorial optimization.

Work in the course: Weekly homework assignments. A **midterm (in class on 8 March 2000)**, and **final on 25 April 2000, 4 to 6 PM**. Two Computational projects to be solved using AMPL.

Approximate weights for determining final grade are: Homeworks (0.15), Midterm (0.25) Final (0.5), computer projects (0.1).