Mathematical Programming II (OR&IE 631 – Spring '96)

- **Instructors**: Edoardo Amaldi, 236 Rhodes Hall, 4-4606, amaldi@cs.cornell.edu and Oktay Günlük, 238 Rhodes Hall, 5-7885, oktay@orie.cornell.edu
- **Schedule**: M/W 12:10-1:20 pm
- **Room**: Olin Hall 145
- **Office hours**: Monday 2:00-4:00 pm
- **Course Outline:**
  - Linear Programming: Review of LP, (Revised) Simplex Method. Duality and Sensitivity Analysis. Network Simplex Method. The Transportation and Assignment Problems.
  - Decomposition and Column Generation: Dantzig-Wolfe and Benders'.
  - Nonlinear Programming: Constraint qualification. Necessary/sufficient optimality conditions (Kuhn-Tucker, Saddle-points and Lagrange functions). Lagrangean duality theory.
  - Selected methods for smooth or nonsmooth optimization with or without constraints.
  - Integer Programming: Relaxations (Lagrangean, etc...), Cutting Plane Methods, Branch and Bound.
  - Mathematical Programming in pattern recognition and machine learning: Inconsistent linear systems and linear classifier estimation. Learning from examples as an optimization problem. Beyond linear classifiers: artificial neural networks and support vector networks.
- **References:**

  - M.S. Bazaraa, J.J. Jarvis and H.D. Sherali, *Linear Programming and Network Flows*, Wiley, New York (1990).
  - M.S. Bazaraa and C.M. Shetty, *Nonlinear Programming*, Wiley, New York (1993) 2nd edition.
  - M. Minoux, *Mathematical Programming: Theory and algorithms*, Wiley, New York (1986).
  - G.L. Nemhauser, A.H.G. Rinnooy Kan and M.J. Todd, editors, *Handbooks in OR/MS: Optimization*, North-Holland, Amsterdam (1989).
  - G.L. Nemhauser and L.A. Wolsey, *Integer and Combinatorial Optimization*, Wiley, New York (1988).