MATH 582 B ⋈ Convex Optimization Algorithms ⋈ WIN 2009

WHERE & WHEN: MOR 219 at 9:30-10:20 a.m. on M, W, F.

WHO: Paul Tseng (Office: Padelford C-344; Tel: 206 543-1177)
Email: tseng@math.washington.edu;
Web: http://www.math.washington.edu/~tseng/582.html

OFFICE HOURS: Thursdays 2-3:30

TEXTBOOK: Lecture notes will be posted semi-regularly on the above webpage. Relevant references:

- A. Ben-Tal, A. Nemirovski, Lectures on Modern Convex Optimization, MPS-SIAM Series on Optimization, SIAM, Philadelphia, 2001.
- Y. Nesterov, Introductory Lectures on Convex Optimization, Kluwer, 2004.
- S. Boyd and L. Vandenberghe, Convex Optimization, Cambridge University Press, 2004; also available on-line as a PDF file.

GRADING: The grading will be based on a problem set and a project, due March 9. The problem set will comprise 5 problems of type A (easier) and 3 problems of type B (harder), which you can choose from a list that will be posted as the quarter progresses. Information about the project will be posted by early February.

ABOUT THIS COURSE: Convex (conic) optimization problems arising from applications or as approximations of NP-hard problems are often large, but structured. Exploiting the structures, possibility through duality, is key to solving these problems efficiently. We will examine different types of structures and, for each, look for algorithms that best exploit the structures. The problem types include conic (semidefinite cone, second-order cone), and "simple" non-smooth. The algorithms include first-order gradient methods and second-order Newton methods (e.g., interior-point methods). Issues such as convergence, complexity, and implementation will be covered. Some approximation bound for NP-hard problems will also be covered.

> In fact, the great watershed in optimization isn't between linearity and nonlinearity, but convexity and nonconvexity.
>
> – Terry Rockafellar.