COM 5245 Optimization for Communications (通訊之最佳化方法)

Lecture times: **W3 W4 F5** Classroom: **Room 104**, EECS Building

(**Spring Semester 2009**)

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Goal:

To introduce optimization concepts and methods, and their applications to engineering problems such as those in wireless communications and signal processing. The convex analysis and optimization as well as available software has been an essential theory and tools for solving a wide range of science and engineering problems, e.g., digital filter design, multi-input multi-output (MIMO) coherent/non-coherent detection, space-time block coding, downlink beamforming, optimum transceiver design, blind source separation and biomedical imaging, hyperspectral imaging, to name a few.

Background: A good background in linear algebra and matrix theory is desirable, but not essential.

Course Outline:

1. Basic principles of optimization
2. Convex sets
3. Convex functions
4. Convex optimization problems
5. Duality
6. Unconstrained minimization
7. Interior-point methods
8. Applications to engineering problems
9. Selected topics in latest optimization methods for communications

Textbook:

Boyd and Vandenberghe, *Convex Optimization*, Cambridge University Press, Cambridge, 2004.
Also: http://www.stanford.edu/~boyd/cvxbook/

References:

R. Fletcher, *Practical Methods of Optimization*, John Wiley and Sons, 1988

D. P. Bertsekas, *Convex Analysis and Optimization*, Athena Scientific, 2003.

Remarks:

1. The language of instructions is English.
2. We are against plagiarism. Those who are found committing any (even slight) form of plagiarism in assignments, projects, and examinations will be seriously punished; for example, getting no score for the whole course.