

University of Toronto, Department of Computer Science, Fall 2010

## **csc2600 — Topics in Computer Science: Convex Optimization**

**Description:** Convex optimization is a form of non-linear optimization that includes linear programming and least squares as special cases. Like linear programming and least squares, convex optimization has a fairly complete theory, very efficient algorithms, and a wide range of applications. Application areas include computer science, engineering, statistics, finance, economics and operations research.

This course is an introduction to the theory, algorithms and applications of convex optimization. The goal is to give students a working knowledge of the subject, i.e., the ability to recognize, formulate, and solve convex optimization problems. Topics covered will be selected from the following: convex sets and functions, linear and quadratic optimization, geometric and semidefinite programming, strong and weak duality, algorithms for constrained and unconstrained problems, interior point methods, and applications. The course should be of special interest to students in machine learning, machine vision, graphics, numerical analysis, combinatorial optimization and electrical engineering.

**Area:** This course is in area 2C.

**Prerequisites:** Good knowledge of linear algebra and vector calculus, and a willingness to program in Matlab. Prior exposure to linear programming and basic probability would be helpful, but is not necessary. Mathematical maturity will be assumed.

**Grading Scheme:** There will be three or four assignments and possibly a test or exam. On all work, 20% of the mark will be for quality of presentation, including the use of good English. Late assignments will not be accepted.

**Text:** Boyd and Vandenberghe, *Convex Optimization*, Cambridge University Press, 2004. Freely available on the web at [www.stanford.edu/~boyd/cvxbook](http://www.stanford.edu/~boyd/cvxbook).

**Instructor:** Anthony Bonner. office: BA4268, phone: 416-978-7441,  
email: bonner [at] cs [dot] toronto [dot] edu, web site: [www.cs.toronto.edu/~bonner](http://www.cs.toronto.edu/~bonner).

**Lectures:** Tues 1:00-2:30 in BA2139, and Fri 2:00-3:30 in GB221. There will be no class on Nov 16 and 19. Some lectures may be only 1 hour in length.

**Course Web Page:** [www.cs.toronto.edu/~bonner/courses/2010f/csc2600/](http://www.cs.toronto.edu/~bonner/courses/2010f/csc2600/)