UNIVERSITY OF CALGARY

FACULTY OF SCIENCE
Department of Mathematics and Statistics

Applied Mathematics 425 Introduction to Optimization

(see Course Descriptions for the applicable academic year: http://www.ucalgary.ca/pubs/calendar/)

Syllabus

Topics	**Number of Hours**
Unconstrained optimization: one variable, several variables	9
Convex optimization: convex sets and convex functions optimal conditions, geometric programming	4
Introductory numerical methods: one dimensional searches, Newton's method (in several variables), steepest descent	5
Practical numerical methods: conjugate gradient, quasi-newton	5
Least squares: least squares fit, minimum norm solutions	5
Linear programming: simplex method, primal-dual method	5
Constrained optimization: penalty methods, Lagrange multipliers	5
TOTAL	36

AMAT 425 : Intro to Optimization

Course Outcomes

At the end of the course the students will be able to:

1. define constrained optimization problem,
2. define convex optimization problem,
3. test Euclidean subsets for convexity,
4. test univariate (not necessarily differentiable) functions for convexity,
5. define and recognize basic sub-types of convex optimization problems, such as least-squares, linear programming, QP, QCQP, SOCP, and possibly SDP,
6. give concrete examples of convex optimization applications in areas like statistical estimation (MLE), math finance (portfolio optimization), approximation of hard combinatorial problems (boolean LP relaxation), etc.
7. convert exemplary (real-world) word problems into abstract convex programs, and use MATLAB CVX environment to solve the problems above.

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Prerequisite change made 2008:07:01
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