

**MATH 5750/6880 TOPICS IN OPTIMIZATION
FALL 2008 SYLLABUS**

Instructor: Fernando Guevara Vasquez.

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Office hours: MWF 11am-12pm or by appointment.

Textbook: This class is mostly based on the book “Numerical Optimization” by Nocedal and Wright (second ed, Springer).

Prerequisites: Vector calculus (Math 2210 or similar), Linear algebra (Math 2270 or similar) and basic Matlab knowledge.

Hours and Classroom: MWF 9:40am-10:30am, LCB 225.

Course website:

http://www.math.utah.edu/~fguevara/math5750_f08

Description: We study numerical methods and theory for solving the rather general optimization problem:

$$\begin{aligned} \min & f(\mathbf{x}) \\ \text{s.t. } & g(\mathbf{x}) = 0 \\ & \text{and } h(\mathbf{x}) \geq 0. \end{aligned}$$

Here $\mathbf{x} \in \mathbb{R}^n$, and f and g are possibly vector valued functions. Most of the methods covered assume some knowledge about the derivatives. If time permits, we will also visit methods that do not require derivatives.

- Unconstrained optimization
 - Necessary and sufficient optimality conditions
 - Newton’s method
 - Line search
 - Quasi-Newton methods, non-linear least squares
 - Adjoint state method (for computing derivatives)
- Constrained optimization
 - Constraints qualifications
 - Optimality conditions
 - Trust region methods
 - Linear programming (simplex and interior point methods)
 - Quadratic programming
- Other optimization methods

Grading: homeworks 40%, project 60%. Homeworks will be given roughly bi-weekly. The project will consist in applying the methods in class to your particular research problem or to a problem chosen in conjunction with the instructor.

Students with Disabilities: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.