ECE520/MATH520
Optimization Methods for Control and Communication

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Objectives

- Introduction to optimization theory and methods, with applications in systems and control.
- Analysis of optimization problems.
- Optimization algorithms and their analysis.
- Ability to make precise statements about optimization problems.

Brief Course Description

- Unconstrained and constrained optimization theory
- Algorithms and search methods for optimization, and their analysis (includes: quasi-Newton, recursive least squares, genetic algorithm)
- Examples from various engineering applications

Text

- E. K. P. Chong and S. H. Żak, *An Introduction to Optimization, Second Edition*, New York, NY: John Wiley & Sons, Inc., 2001. ISBN 0-471-39126-3.

Prerequisites

- Working knowledge of linear algebra (matrix manipulations, vector spaces, bases, eigenvalues, quadratic forms)

- Working knowledge of calculus of several variables (differentiating functions of n variables, chain rule, gradients, Taylor series, limits)
- Basic state-space systems in discrete time (desirable but not required).
- An appreciation of rigour.

Grading

- Homework due every two weeks: 10%
- Two in-class tests: 30% each
- Final exam: 30%
- Project: none

Homeworks

- The homeworks serve two objectives:
  1. As exercises to familiarize students with concepts. (Easy)
  2. As vehicles for learning and exploring concepts. (Hard)

Computer use

- Access to e-mail and WWW.
- Familiarity with MATLAB desirable (but not required).

Examples of optimization problems

- Optimal control
- Parameter estimation
- Optimal design
- Neural network training
- Optimal pricing
- Investment planning

Contact information

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Course web page

- http://www.engr.colostate.edu/ ˜echong/ee520/

Course web page contains

- Organizational Information
- General Course Information
- Course Policies
- Lecture and Homework Schedule
- Matlab demos
- Password protected materials

Password protected materials:

- Class notes
- Homework solutions
- Exam solutions (past and present)
- Solely for the use of current ECE520/MATH520 students.
- Please do not copy or circulate any of these documents without the permission of Professor Chong.
- User Name: _____
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