Course announcement for Spring 2011

ASE 381P.4, Numerical Methods in Optimization

Instructor: Prof. David G. Hull, WRW 408C, 471-4908
Time: MWF 9:00 – 10:00
Place: WRW 413
Office hours: MWF 10:00 -11:00
Homework: Eight computer assignments using Matlab
Exams: One mid-term exam and one end-term exam
Grade: 60% homework, 20% mid-term exam, 20% end-term exam
Objective: This is a course in the numerical optimization of points (parameter optimization) and curves (calculus of variations/optimal control theory), and its objective is to make numerical optimization a useful tool. The first part of the course covers parameter optimization which is also called nonlinear programming. Next, the optimal control problem is converted into a parameter optimization problem, and solution techniques are discussed. Finally, the solution of the optimal control problem by the shooting method is discussed. The computer assignments are designed to enable the student to experience the actual behavior of several optimization algorithms.

Web site: www.ae.utexas.edu/courses/ase381p.4

Contents:
Parameter optimization /nonlinear programming
   Unconstrained minimization
      One-dimensional search
      Gradient, Newton-Raphson, and variable-metric methods
   Constrained minimization
      Unconstrained minimization using penalty functions
      Sequential quadratic programming
Suboptimal Control
   Review of explicit and implicit numerical integration
   Conversion of optimal control problems into parameter problems
Optimal Control
   Two point boundary problem (TPBVP)
   Solution of the TPBVP by the shooting method