MAD 5420: NUMERICAL OPTIMIZATION (Spring 2011)

PROFESSOR: Ionel M Navon (Dept of Scientific Computing)

Meeting Days : MWF at 2:30 -3:20 LOV 201

OFFICE HOURS: MW 3:30-4:15; TR 8:15-9:00; W 8:30-9:30
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by Jorge Nocedal and Stephen Wright (Hardcover - Jul 27, 2006)

COMMUNICATION:  I will communicate with you via email (HW and exam hints and solutions, revisions in the schedule).
You should access your Garnet account 2-3 times per week as well as regularly access your Blackboard academic suite where items related to course content will regularly be posted.

COURSE GOALS: The course intends to provide the students a thorough understanding of numerical optimization methods for unconstrained and constrained non-linear programming as well as modern methods of stochastic global optimization (simulated annealing and genetic algorithms).
This by combining recent theory with concrete practical and computational experience based on analysis and comparison of efficient up-to-date algorithms for solving real life optimization problems and their implementation on supercomputers, taught by an instructor active in research in optimization.
The material will be presented in a manner reflecting most recent advances in the field during the last 15 years along with adequate software to illustrate each method.

Course Prerequisites: The course is intended primarily to graduate students and senior undergraduate students ( with instructor's permission) with some background in linear algebra, and with basic knowledge of either FORTRAN or C/C++ as well as familiarity with one of the operating computer systems at FSU. Talented undergraduate students will be accepted on the basis of permission of the instructor. Graduate students in Computational Science, Mathematics, in particular Financial Mathematics, Physics, Meteorology and Oceanography, Chemistry, Economics and Engineering are particularly welcome.

Linear Algebra. A thorough knowledge of matrix algebra is essential, including Gauss elimination, the theory of systems of equations, row and column spaces, inner products, and eigenvectors.

Calculus. A thorough understanding of multi-variable differential calculus is vital. This includes directional derivatives, gradients, and the minimization of functions of two variables.

Programming. No particular language is required, but some experience in programming will be useful. Most assignments will involve the use of MATLAB, FORTRAN or C++ software.
**HONOR and CONDUCT CODES.**

The Academic Honor System of FSU is based on the premise that each student has the responsibility to (1) uphold the highest standards of academic integrity in the University community, (2) foster a high sense of integrity and social responsibility on the part of the University community. VIOLATIONS OF THIS ACADEMIC HONOR SYSTEM WILL NOT BE TOLERATED IN THIS CLASS. Specifically, incidents of plagiarism of any type or referring to any unauthorized material during examinations will be rigorously pursued by the instructor.

Please read the “Academic Honor System” and “Student Conduct Code” in its entirety (FSU Student Handbook) and ask the instructor to clarify any of its expectations. Students must also obey local ordinances, plus State, Federal, and appropriate International laws.

**AMERICAN DISABILITIES ACT.** Students with disabilities needing academic accommodations should:

1) register with and provide documentation to the Student Disability Resource Center (SDRC);
2) bring a letter to the instructor from SDRC indicating you need academic accommodations.

This should be done within the first week of class.

**GRADING (with approximate percentages)**

1. ONE 50 MINUTE Mid-TERM EXAM: 25%.
   If you miss an examination, notify me via email as soon as possible. Your score on the missed exam will be based upon the final exam.
2. FINAL EXAM: 35%.
3. ASSIGNMENTS: 40%.
   a. Assignments are due at the beginning of class on the date due; reduced credit for late assignments.
   b. All work must be neatly done and legible. Usually a discussion will be appropriate; proper English and mathematical notation are required. Graph/quadrille paper required for all graphs.
   c. All assistance (except the text and instructor) given or received must be explained clearly.
   d. Some problems will involve the use of computer software (e.g. Matlab or FORTRAN).
4. GRADING STANDARDS: A=88-100%, B=75-87.9%, C=60-74.9%, D=50-59.9%.
   Plus/Minus grades will be assigned for the top/bottom 25% of each grade range (no A+, F+, and F)