OR 644 Nonlinear Programming/OR 750 Advanced Nonlinear Programming
Spring 2014, Wednesday 4:30-7:10,
West Building 1008

Professor
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Text
Igor Griva, Stephen G. Nash, and Ariela Sofer, Linear and Nonlinear Optimization (2nd Edition) SIAM Books, (2008).

Course description
Nonlinear programming problems arise in a wide variety of applications, such as engineering design, finance, energy modeling, and medical diagnosis and treatment. This course provides an introduction to the theory and methodology of nonlinear programming. After a review of the required mathematical background, we will study the theory of unconstrained optimization. We will then discuss methods for minimizing unconstrained functions, including Newton's method, the steepest descent method, the conjugate gradient method and truncated Newton methods, and will discuss the merits and disadvantages of each of these methods. We will continue to study the theory of constrained optimization, and then discuss methods for constrained optimization, including active set methods and penalty and barrier methods.

Throughout this course we will solve a number of applied nonlinear programming problems using a variety of optimization software packages. These software packages (solvers) may be accessed via the internet through the NEOS Server. The front end to the solvers will be the modeling language AMPL. A student edition of the software can be downloaded from www.ampl.com. However since AMPL files are ASCII (text) files, there is no need for you to download the software especially since we will be using the NEOS nonlinear solvers. Some basic knowledge of Matlab is useful for the class but not a requisite.

Grading
There will be an in-class midterm examination, and a take-home final. Each exam will be worth 25% of the grade. The midterm exam will be open book, open notes. Homeworks will be assigned regularly. In addition students will have to complete two projects. These projects will involve solving via a variety of nonlinear optimization algorithms, using AMPL as the modeling language. The homeworks will make up 20% of the grade and the two projects will make up 30% of the grade. In computing the final grade, the lowest homework grade will be dropped.

Homeworks
All homeworks and projects will be posted to the class through the Blackboard system

Exam Dates
Midterm: Wednesday, March 19
Final exam due: Wednesday May 7, 5:00 pm

Fundamental rules

- Make-up exams will only be given for extreme situations, and only if I am contacted before the exam is given and full arrangements are established. Full adherence to this policy is the responsibility of the student.
- The exam dates above are tentative, and it is the students responsibility to keep abreast of changes.
- Homework will be assigned each class, and usually collected. All work must be clearly written. Illegible work will not be accepted.
- There will be a penalty of 10% of the total grade for every day the homework is late.