

Syllabus – Math 577 – Optimization
Fall 2005 - MWF 1:25-2:15 - Ayres 309B

Course Information:

This course covers the theory, techniques and algorithms of optimization. We'll get an overview of the various types of problems and the various methods, then we'll study individual methods from both a theoretical and practical standpoint.

The prerequisites for this course are: Multi-variable calculus, linear algebra, introductory numerical analysis/methods, some experience programming in FORTRAN, PASCAL, C, or a similar language and some experience with proofs. We will spend some time reviewing the important elements from these areas.

Course Outline: (details on class webpage)

1. Review of Linear Algebra, Multivariable Calculus and Numerics (Appendix A)
2. Unconstrained Optimization
 - (a) General Theory (Ch. 2, 7)
 - (b) General Line Search Methods (Ch. 3)
 - (c) Trust-Region Methods (Ch. 4)
 - (d) Specific Line Search Methods (Ch. 5, 6, 8, 9)
3. Constrained Optimization
 - (a) General Theory (Ch. 12, 15)
 - (b) Quadratic Programming (Ch. 16)
 - (c) Penalty Methods (Ch. 17)
 - (d) Sequential Quadratic Programming (Ch. 18)
 - (e) (Linear Programming (Ch. 13, 14), if time)

Resources:

- ◇ Text: *Numerical Optimization*, by Jorge Nocedal and Stephen J. Wright, Springer-Verlag, 1999.
- ◇ Web-page: <http://www.math.utk.edu/~ccollins/M577> Source of other resources, class information, handouts, homework, etc.

Grading:

- ◇ Homework (70%):
 - Regularly assigned problems from the book and other sources
 - Case studies involving an application and some programming
- ◇ Final Project (30%): Involving a comparison of algorithms or a more in-depth case study. Due at the end of the semester. More details later.

Instructor:

Charles Collins - 312B Ayres Hall - 974-4269 or 974-2461 - ccollins@math.utk.edu
Office Hours: To Be Announced

University's Honor Statement:

“An essential feature of the University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.”

Plagiarism:

“Students shall not plagiarize. Plagiarism is using the intellectual property or product of someone else without giving proper credit. The undocumented use of someone else's words or ideas in any medium of communication (unless such information is recognized as common knowledge) is a serious offense, subject to disciplinary action that may include failure in a course and/or dismissal from the university. (from Hilltopics Student Handbook 2004-05, page 11)

For this class, this means that

1. You must document any homework solutions you get from other sources (book, web, etc.). To document means to give the title, author and page number or web address. This should be at the beginning of your solution write up. You should also document when you get the main idea for the solution from another written resource or use a major theorem or result that is not in our primary text. You do not have to document results from our primary text.
2. Your written work should primarily be your own. You may discuss homework problems with other students, but you may not share written solutions. If you work on a problem with another student, you both should indicate so on your writeup by saying “I worked with *name* on this problem.”

If there is an obvious violation of these policies, you will receive a 0 on the problem (1st offense), 0 on the homework set (2nd offense), or 0 in the course and report to the administration (3rd offense). If there are signs that undocumented sharing is going on (like too similar notation, examples, arguments or mistakes), I will give a warning (once).

Late-Work Policy

All work is to be turned in by the end of class on the day that it is due. Late work will be penalized 20% per day (off of base value), unless there is a previous arrangement or proof of emergency. Each student gets **one** free late-turn-in for homework, where they can turn in the assignment at the next class period with no penalty.