

Math 250-02

**Classic Papers in Applied Mathematics
Course Information**

Spring 2012

BLOCK: F+ (Tuesday, Thursday 12:00-1:20)

INSTRUCTOR: Scott MacLachlan

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OFFICE: Bromfield-Pearson 212

OFFICE HOURS: (Fall 2011) Tuesday 9:30-11:30 and Thursday 9:30-10:30

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PREREQUISITES: Permission of the Instructor. Some background in numerical analysis is necessary; students who complete Math 250-01, Numerical Analysis, in Fall 2011 will certainly be prepared, but this is not a requirement to take the class.

TEXT: No textbook will be required; the course will focus around the reading of papers that will be distributed electronically.

COURSE DESCRIPTION: This course focuses on the reading of a group of the key historical papers in applied and computational mathematics. We will survey a wide range of topics in applied mathematics, including iterative methods for linear systems, optimization, integration, approximation, and PDEs. Specific papers to be read may include

- Householder on the QR factorization
- Concus, Golub, and O'Leary on preconditioned CG
- Saad and Schultz on GMRES
- Brandt on multigrid
- Dantzig on the simplex method
- Lax and Wendroff on conservation laws
- Cooley and Tukey on the Fast Fourier Transform

For each topic, we will consider one or two of the original papers in the field, the historical background for the papers, their treatment in modern textbooks, as well as one or two modern papers that build on these original ideas. This course will require significant participation on the part of all students, in the presentation and discussion of the readings. In particular, for each topic, one student will be responsible for presenting the paper itself and its historical context, while another will be responsible for presenting its treatment in the modern literature. There will be no exercises or exams for this course; all of the coursework will focus on reading and presenting results from the mathematical literature.