Math 3072 Finite Element Methods
Course #18893, Spring 2007 (2074)

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Lecture: MWF 1:00–1:50, Thackeray 704.
Office hours: MWF 2:00-3:00 and by appointment.

Class web page:
zeus.math.pitt.edu/~yotov/teaching/07-2/math3072.html

Textbook: The course will not follow closely a specific text book. The book Understanding and Implementing the Finite Element Method by Mark Gockenbach, SIAM 2006, will be used as a reference on implementation issues.

Prerequisites: Good undergraduate background in linear algebra and advanced calculus. Familiarity with partial differential equations will be useful.

Content: This course is an introduction to the theoretical and computational aspects of the finite element method for the solution of boundary value problems for partial differential equations. Emphasis will be on linear elliptic, self-adjoint, second-order problems, and some material will cover time dependent problems as well as nonlinear problems. Topics include: Sobolev spaces, variational formulation of boundary value problems, natural and essential boundary conditions, Lax-Milgram lemma, approximation theory, error estimates, element construction, continuous, discontinuous, and mixed finite element methods, and solution methods for the resulting finite element systems.

Topics to be covered:

- FEM for two point boundary value problems
- Brief introduction to Sobolev Spaces
- FEM for elliptic equations
- Approximation theory for FEM
- Non-conforming and mixed FEM
- FEM for parabolic equations
- FEM for advection diffusion equations
- FEM for hyperbolic equations
**Homework:** Written homework and several computational projects will be assigned. Suggested programming language is Matlab. In the computational projects we will utilize the software provided with the textbook.

**Exams:** There will be one in-class midterm exam, a paper presentation, and a final project.

**Grading Policy:** Midterm - 15%, final project - 15%, presentation - 15%, homework and computer assignments - 55% of the final grade.

**References:**


If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union, (412) 648-7890/(412) 383-7355 (TTY), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.