Course No.: Math 536

Course Title: Numerical Analysis of PDEs

Core Course: yes

Term: Winter

Instructor: Peter Minev

Syllabus:
Numerical solution of linear algebraic systems: direct methods, classical iterative methods, conjugate gradients and multigrid techniques.

Finite difference methods for elliptic, first order hyperbolic and parabolic PDE’s. Convergence, consistency and stability. Applications to problems in science and engineering.

Finite element methods for elliptic and parabolic equations.

Prerequisites: The required background includes undergraduate courses in Linear Algebra, PDE’s and Numerical Analysis. You must be capable in writing a computer code in at least one programming language, and also be familiar with standard visualization software (e.g. Matlab, Maple etc.) for presentation of your numerical results.


Course notes are also available on the web site of the instructor.

Grading: Assignments (approximately 5) 20%
Midterm examination 35%
Final examination 45%

Assignments: There will be (approximately 5) bi-weekly assignments throughout the term. These assignments will contain mostly computational problems involving a lot of programming. They are due on the day before the second last lecture of the term. During the last two lectures all students will make a presentation based on their assignments. They should be prepared to answer questions on their presentation and the course material related to it. The programming languages are preferably, but not limited to, Fortran, C (C++), python, or Matlab (in Matlab or python, no use of their linear algebra routines is allowed). No collaboration on assignments is allowed.

Exams: The time for the midterm and final exams will be decided in the course of the term so that it is suitable for both the students and the instructor. The final exam is comprehensive and covers the entire material.