Numerical Methods for Partial Differential Equations

MATH 659V Section 001 (UAConnect 10571)

Spring 2018
MWF 9:40 - 10:30

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Calculus (and so differential equations) depend fundamentally on the *infinitesimal*, which computers don't do. *Discrete calculus* continues to be unreasonably effective nonsense.

Will discuss finite difference, spectral, and finite element methods for the approximate solution of partial differential equations.

Finite difference and finite element methods typically require the solution of large sparse systems of linear equations; we will discuss both direct and iterative techniques for solving these systems.

Many subtopics are possible, including sparse matrix data structures and graph theory, parallel processing techniques, grid generation, eigenstuff, etc. If you have topics or specifics that you would like covered, we can possibly work that in...

Programming is encouraged, but is not a required element of the course (nor is any specific programming language emphasized). Grades will be based on presentations (like a seminar) and/or projects.

This will *not* be a course about how to use PDE packages (e.g. COMSOL, Simulink, ANSYS, NASTRAN, etc.), but about the algorithms such packages use. Neither will it be heavy on modeling, but rather more about simulating the evolution of assumed models.

A differential equations course and a linear algebra course (or equivalent) are minimum **prerequisites**. If you are not a graduate student, we need to talk before you can enroll. If you want to register for more than 3 hours, we need to talk first.