University of Toronto
Department of Mathematics
Mat1062H
Introductory Numerical Methods for PDE
Winter 2009

Instructor: Mary Pugh `mpugh@math.utoronto.ca`
`http://www.math.utoronto.ca/mpugh/Teaching/Mat1062/mat1062.html`
Lecture: Tu, 11:10am–12pm, MP 134, Th 10:10am-12pm, MP 134
Office Hours: by appointment, ES 3141.

Course description: We will study numerical methods for solving partial differential equations that arise in physics and engineering applications. Special attention will be paid to how the design of effective numerical methods relates to the mathematical structure of the equation. Most of the course will be for 1-d equations.

Prerequisites: There are no prerequisites other than a friendly attitude towards PDE and computers. You can pick up the computing on the fly, you needn't have programmed before.

If you have programmed before and if you've already taken a course in numerical analysis and numerical linear algebra then you might also want to audit or enroll in CSC 446/2310 "Computational Methods for PDE" which is meeting W1-3, F2-3 in BA B024. This course will have a different flavour than mine and so I recommend it as well.
`http://www.cs.toronto.edu/~ccc/Courses/cs446-2310.html`

Assessment: Final exam 40%. Term exam 25%, Feb. 26. HW 35% total, about every two weeks, with programming.

Approximate Outline:

- Parabolic equations
  - Boundary conditions
  - Explicit and implicit discretizations
  - Consistency, stability, and convergence
  - Multi-dimensional problems
- Elliptic equations
  - Variational formulations and finite element methods
- Hyperbolic equations
  - CFL stability
  - Finite Volume Method
  - Nonlinear conservation laws, shock capturing
- Special topics (as time permits)
  - Spectral methods
  - Pseudo-spectral methods