

**Computational Differential Equations**  
**Math 60790 Spring 2009**  
**Hayes-Healy 127: MWF 9:35-10:25AM**  
**Andrew Sommese (Instructor)**

This first-year graduate course is a solid introduction to the numerical solution of differential equations.

The prerequisites are advanced calculus, some linear algebra, and a basic numerical analysis course. Math 60690 is more than sufficient as a prerequisite. An undergraduate course combined with a willingness to learn topics missed from that course is also sufficient.

Though the main focus of the class will be systems of partial differential equations, the course will start with ordinary differential equations. Both difference methods and finite element methods will be covered. In particular we will develop the theory of piecewise polynomials in several dimensions and Galerkin's Method.

We will follow [1] for the presentation of the finite element method, and apply it to an assortment of equations including Poisson's equation, the heat equation, the wave equation, stationary and time dependent convection-diffusion equations.

Eigenvalues of systems will also be covered.

## References

- [1] K. Eriksson, D. Estep, P. Hansbo, and C. Johnson, Computational Differential Equations, paperback edition, Cambridge University Press.