Numerical Analysis II
Math 60790 Spring 2010
Hayes-Healy 229: T&TH 9:30-10:45AM
Andrew Sommese (Instructor)

This first-year graduate course is a solid introduction to the numerical solution of systems of polynomials and 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.

The course will cover the numerical computation of possibly positive dimensional solution sets of systems of polynomials. For this material we will follow [2].

Both difference methods and finite element methods for ordinary differential equations and partial differential equations will be covered.

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.

[2] A.J. Sommese and C.W. Wampler, *Numerical solution of systems of polynomials arising in engineering and science*, (2005), 401+xxii pages, World Scientific Press, Singapore.