Course No:	Mat 8510, Fall, 2007		
Course Title:	Advanced Numerical Analysis II		
Instructor:	Ming-Jun Lai	**Phone Number:**	542-2065
Office:	Grad. Studies 540	**Office Hour:**	2:30–3:30MWF or by Appointment
Text Book:	Finite Elements, by D. Braess		
	Numer. Solution of PDE:		FiniteDifference Methods
	by G. D. Smith		Third Edition
Classroom:	Room 302, Boyd Grad. Studies Building		
Class Time:	1:15pm–2:05pm MWF		

This course will cover some basic theory of finite element methods for elliptic differential equations. Mainly, the following topics will be covered: weak solutions of elliptic equations, Ritz-Galerkin approximation of PDE's, Riesz representation theorem, Lax-Milgram's theorem, Céa's lemma, polynomial splines approximation properties, nonhomogenuous boundary value problems of Poisson and biharmonic equations, heat and diffusion equations, Navier-Stokes equations. Also, some finite difference methods, e.g., Crank-Nicholson's method, as well as collocation methods and multiplicative Schwarz domain decomposition methods will be covered.

I will give you two sets of MATLAB programs for Poisson equations and biharmonic equations (based on bivariate spline theory) which enable you to solve standard Dirichlet and Neumann boundary value problems of Poisson equations as well as the biharmonic equations with the first kind of boundary values.

We will have two take-home tests and two computer projects. Each of them is worth 100 points.