

**EM 394F/ ASE 384P/ CAM 394F FINITE ELEMENT METHODS**  
**Spring 2009, # 13690/ # 13110/ # 64080, MWF 2:00 - 3:00 p.m., WRW 312**

**Text:**

1. L. Demkowicz, *Computing with  $hp$ -Adaptive Finite Elements*, Chapman & Hall/CRC, Boca Raton 2006, ISSN:-10: 1-58488-671-4
2. E. Becker, G. Carey, and J.T.Oden, *Finite Elements: An Introduction, Vol.1*, Prentice-Hall, Inc., 1981 (optional).
3. Ch. Schwab, " *$p$  and  $hp$ - Finite Element Methods*", Oxford Science Publications, Clarendon Press - Oxford 1998 (optional).

**Topics:**

<b>Week</b>	<b>Topic</b>
Jan 21 -Jan 23	A Class of 1D Boundary-Value Problems, Variational Formulation
Jan 26 -Jan 30	Galerkin Approximation, Finite Element Methods
Feb 2 -Feb 6	Development of 1D Code
Feb 9 -Feb 13	Development of 1D Code
Feb 16 -Feb 20	Development of 1D Code
Feb 23 -Feb 27	Minimization of Energy Formulations
Mar 2 -Mar 6	Convergence of FEM
Mar 9 -Mar 13	A Class of 2D Boundary-Value Problems
Mar 23 -Mar 27	FE Approximation on Regular Meshes
Mar 30 -Apr 3	Development of 2D Code
Apr 6 -Apr 10	Development of 2D Code - cont.
Apr 13 -Apr 17	Irregular Meshes, $h$ -Adaptivity
Apr 20 -Apr 24	Development of 2D Code - cont
Apr 27 -May 1	Automatic Adaptivity
May 4 -May 8	Extensions. Review

**Homework:** There will be 4 assignments given in the class, due on the following dates:

No	Subject	Date due
1.	Analysis of a model problem	Feb 9
2.	1D Code	Mar 2
3.	1D Error Analysis	Mar 30
4.	2D Code	May 4

**Exams:** There will be two (closed book) exams according to the following schedule:

- Mid-term exam Mon, Mar 9, ACES 6.304, 5-7 p.m.
- Final - given during the official scheduled time.

**Grading:** Is based upon the assignments and the exam scores, with these items weighted as follows:

Assignments	- 50 % (5 + 10 + 10 + 25)
Exams	- 20 %, 30%

**Instructor:** Dr. Leszek Demkowicz, ACES 6.326, Office hours: MW 1:00-2:00.