

ABE 450 - Fall 2001

Finite Element Method in Design and Optimization

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Class Time: Tuesday, 9:30 – 10:20 a.m. and 3:30-4:20 p.m., Thursday, 9:30-10:20 a.m.

Office Hours: Tuesday and Thursday, 10:30-11:30 a.m. (Other times by appointment)

Course Learning Objectives:

1. Understand the fundamentals of finite element analysis concepts
2. Solve one- and two-dimensional structural and boundary value problems by finite element methods
3. Apply core course materials to the numerical solution of real-world problems
4. Evaluate and verify finite element solutions
5. Apply finite element analysis to the computer-aided design and optimization process
6. Effectively use a major FEA software tool
7. Broaden/enhance modeling, problem-solving and written communication skills

Course Topics/Practices:

1. Review of Matrix Algebra
2. Solution of Simultaneous Linear Equations
3. Introduction to Finite Element Method (FEM)
4. One and Two Dimensional Linear Elements
5. Element Matrices
6. Coordinate Systems
7. Introduction to ANSYS FEA Engineering Analysis Software
8. Two-Dimensional Boundary Value Problems
9. Conduction and Convection Heat Transfer
10. Fluid Flow Problems
11. Deformation and Stress Analysis of Structural and Machine Systems
12. The Beam Element
13. Truss and Plane Frame Elements
14. Plane Stress and Plane Strain Problems in Design
15. Evaluation and Verification of Numerical Solutions (Solution Accuracy and Reliability)
16. Computer-Aided Design and Optimization
17. Project reports, computer simulation and modeling

References:

1. "The Finite Element Method", O. Zienkiewicz, 4th ed., McGraw-Hill, N.Y., 1990.
2. "Finite Element Analysis", R.H. Gallagher, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1974.
3. "Finite Element Procedures in Engineering Analysis", K.J. Bathe, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1996.
4. "Basics of the Finite Element Method", P.E. Alaire, Wm. C. Brown Publishers, Dubuque, Iowa, 1985.
5. "Finite Element Structural Analysis", T.Y. Yang, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1986.
6. "An Introduction to the Finite Element Method", J.N. Reddy, McGraw-Hill, N.Y., 1993.
7. "The Finite Element Method", T.J.R. Hughes, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1987.
8. "The Finite Element Method for Engineers", K.H. Huebner, E.A. Thornton, T.G. Byrom, John Wiley and Sons, N.Y., 1995.
9. "The Finite Element Method in Heat Transfer and Fluid Dynamics", J.N. Reddy and D.K. Gartling, CRC Press, Boca Raton, 1994.
10. "The Finite Element Method in Engineering", S.S. Rao, Butterworth-Heinemann, Boston, 1999.

Grading		Percent of Grading
Two Mid-Term Exams	40%	90% - A
Homeworks	20%	80% - B
ANSYS Computer Projects	20%	70% - C
Final Exam	20%	60% - D
		Below 60% - F

Academic Honesty:

The policy of Purdue University is as follows:

"The commitment of the acts of cheating, lying, stealing, and deceit in any of their diverse forms (such as the use of ghostwritten papers, the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated.

Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest."

ABE 450 practices a zero tolerance policy toward cheating. Integrity is an important attribute in the success of Purdue graduates. Thus, cheating on homeworks, quizzes, exams, and term projects will result in failure of the course. This does not mean that students are precluded from studying together for exams and quizzes or from discussing or assisting each other to a "limited degree" on homework problems, in fact, this is encouraged. The bottom line is that we expect and will require you to do your own work.

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Name (print): _____

Date: _____

I have read the course syllabus and understand the cheating policy (absolutely none is tolerated).

Signature

Please return this form to Dr. Haghghi