ME 475
Computer Aided Design of Structures
Spring, 2009

Course Description: Computational methods for analysis, design, and optimization of structural components. Basic concepts in geometric modeling, finite element analysis, and structural optimization.


Time: 11:30 – 12:20 Monday and Wednesday
Room: 310 Ernst Bessey Hall

Web Page: http://www.egr.msu.edu/classes/me475/averillr

Instructor: R.C. Averill, Department of Mechanical Engineering
Office: 2328F Engineering Building
Phone: 353-7188
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Email: averillr@egr.msu.edu

Office Hours: Monday and Wednesday, 2:00 – 3:30 pm (Tentative)
Other times by appointment.

Grading: Laboratory Reports: 25%
Theory Homework: 15%
Exam 1 25%
Exam 2 25%
Final Project 10%

Tentative Outline:
1. Intro to Design Optimization
2. Intro to the Finite Element Method
3. Analysis Classifications, Element Types, and Model Validation
4. FEA of One-Dimensional Problems in Structures and Heat Transfer
5. FEA of Two- and Three-Dimensional Problems
**Late Policy:**
Unless prior approval of the instructor is obtained, a laboratory report or theory homework assignment submitted after the given deadline will be assessed a 20% penalty for each day it is late.

**Make-ups:**
Make-up exams will be offered only in extreme circumstances and when prior permission is granted by the instructor.

**Attendance:**
Strongly recommended, but not used in grade determination.

**Academic Honesty:**
Article 2.3.3 of the Academic Freedom Report states that "the student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the ME Department adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades, and in the all-University Policy on Integrity of Scholarship and Grades, which are included in Spartan Life: 1999 Student Handbook and Resource Guide. Students who plagiarize may receive a 0.0 on the assignment or fail the course or receive more severe sanctions. See the plagiarism policy below.

**Disabilities:**
Students with disabilities should contact the Resource Center for People with Disabilities to develop reasonable accommodations. For an appointment with a counselor, call 353-9642 (voice) or 355-1293 (TTY).

**Important Dates - University and College**

- **January 19, 2009.** Martin Luther King's Birthday. The university is open, but all classes are canceled.
- **February 6, 2009.** Last day to drop a course with a full refund.
- **February 15 – 19, 2009 is Engineer's Week.** A large number of employers will be on campus on various dates for the Student Professional Activities conference, the Career Expo, the E-Week Banquet, and more.
- **March 4, 2009.** Mid-semester. Last day to drop a course with no grade reported.
- **March 9 – 13, 2009.** Spring Break. No classes.
- **April 30 – May 1, 2009 is Design Day,** with most departments in the College now participating.
- **May 4 – 8, 2009.** Final Exams. See [http://www.reg.msu.edu/ROInfo/Calendar/FinalExam.asp](http://www.reg.msu.edu/ROInfo/Calendar/FinalExam.asp) for policies and schedules.
Plagiarism Policy

Department of Mechanical Engineering

Plagiarism is not tolerated in the Department of Mechanical Engineering. It shall be punished according to the student conduct code of the University. Integrity and honesty are essential to maintain society's trust in the engineering profession. This policy is intended to reinforce these values.

For the purpose of this policy, plagiarism means presenting, as one's own, without proper citation, the words, work or opinions of someone else.

A. You commit plagiarism if you submit as your own work:

1. Part or all of an assignment copied from another person's assignment, including reports, drawings, web sites, computer files, or hardware.

2. Part or all of an assignment copied or paraphrased from a source, such as a book, magazine, pamphlet, web site, or web posting, without proper citation

3. The sequence of ideas, arrangement of material, pattern or thought of someone else, even though you express them in your own words. Plagiarism occurs when such a sequence of ideas is transferred from a source to a paper without the process of digestion, integration and reorganization in the writer's mind, and without acknowledgement in the paper.

B. You are an accomplice in plagiarism and equally guilty if you:

1. Knowingly allow your work, in preliminary or finished form, to be copied and submitted as the work of another.

2. Prepare an assignment for another student, and allow it to be submitted as his or her own work.

3. Keep or contribute to a file of assignments with the clear intent that these assignments will be copied and submitted as the work of anyone other than the originator of the assignment. (The student who knows that his or her work is being copied is presumed to consent to its being copied.)

(based upon the MSU English Department's policy on plagiarism at: http://www.msu.edu/unit/engdept/undergrad/plagiarism.html)
ME 475 Course Objectives:

1. Understanding of the finite element method and its use in design of simple structures found in typical engineering applications.

2. Ability to use modern computer assisted geometric modeling, analysis, and design tools used in standard practice in the industry.

3. Ability to use these tools through case studies in design of simple structural components.

4. Ability to communicate technical information through the preparation of technical memoranda, briefs, and reports.

5. Understanding of the theory and practice of optimization of structural components, including optimal sizing of components, and shape and layout design optimization.