Semester: **Spring 2010**

Course Number: MECH 3130
Course Title: Mechanics of Materials
Credit Hours: 4 credit hours (3 Lec + 1 Lab)
Pre-Requisites: MATL 2100, MECH 2110, MATH 2650, MATH 2660, MECH 2220/MECH 3220
Lecture Schedule: Tue, Thu, 12:30 – 1:45 pm (75 minutes) in Ross 136

Instructor
Dr. Hareesh Tippur, Professor of Mechanical Engineering, Rm 262 – Ross Hall
Phone: 844-3327, e-mail: htippur@eng.auburn.edu
Office Hours: T, R 2-3 pm
Course Web-Site: http://www.eng.auburn.edu/users/htippur (look for Mechanics of Materials link)

Teaching Assistants
Chandru Periaswamy, (periach@auburn.edu), 4-3464, Office Hrs: Wed 3-4 pm, Office: Shop 310/211)
Dinesh Arunachalam (dza0005@auburn.edu), 4-7123, Office Hrs: Wed 3-4 pm, Office: Shop 211/Wilmore M103)

Course Objectives
1. To provide students with a mathematical and physical understanding of the concepts of stresses, strains, and deformations. (Program Outcome (P. O.) 1, 2).
2. To teach students stress, strain, and deformation analysis of mechanical members subjected to pure axial loading, torsion, flexure, and combined loading of these situations. (P. O. 1, 2)
3. To translate stress analysis concepts to mechanical design under static loading situations. (P. O. 1)
4. To provide hands-on experience in instrumentation, measurements and computer simulations related to stress analysis of mechanical members. (P. O. 5, 6, 7)

Textbook
- Mechanics of Materials, R.C. Hibbeler, 7th Ed., Prentice Hall, 2008.
- A laboratory manual (part-I & -II available at the Ramsay Copy Center is to be purchased prior to first and eighth laboratory meeting).

Course Outline
stress – normal stress, shear stress; strain – normal and shear strains; stress-strain relations – Hooke's Law; axial loading, stress concentration; torsion of circular sections; bending of beams – bending moment and shear force diagrams; combined loading and pressure vessels; transformation of stresses – principal stresses; failure theories; beam deflection analysis; buckling of columns, strain energy.

Tentative Text Coverage[‡]:
Stress: Chapter-1 (sections 1.1-1.6) (2 classes)
Strain: Chapter-2 (section 2.1-2.2) (2 classes)
Stress-Strain Relations: Chapter-3 (sections 3.1-3.4, 3.6-3.7) (1 classes)
Axial Loading, Temperature Effects, Stress Concentration: Chapter-4 (sections 4.1-4.7) (3 classes)
Torsion of Circular Sections: Chapter-5 (sections 5.1-5.5) (3 classes)
Bending Stresses in Beams: Chapter-6 (sections 6.1 – discontinuity functions – 12. 3, 6.3, 6.4) (3 classes)
Shear Stresses in Beams: Chapter-7) (sections 7.1-7.3) (1 classes)
Deflection of Beams: Chapter-12 (sections 12.1-12.2, 12.7-using discontinuity functions) (3 classes)
Combined Loading and Pressure Vessels: Chapter-8 (8.1-8.2) (2 classes)
Stress and Strain Transformations, Mohr's Circle: Chapters 9, 10 (sections 9.1-9.5, 10.1-10.2) (3 classes)
Failure Theories: Chapter 10 (section 10.7) (2 classes)
Buckling of Columns: Chapter-13 (sections 13.1-13.3) (2 classes)
Strain Energy: Chapter-14 (sections 14.1-14.2) (1 classes)
Exams: (2 classes)

[‡] based on March 2002 syllabus revision approved by ME Department.

Laboratory Component (Labs Meet in Shop Building Room 221 and Ross Hall Computer Lab)
Section-1 Thursday 2-4:20 pm
Section-2 Thursday 5-7:20 pm
Section-3 Friday 12-2:20 pm
Section-4 Friday 3-5:20 pm

Tentative Laboratory Schedule

Week #	Monday's Date	Laboratory Exercise
1.	January 11	Lab-1 Cetroids & Moment of Inertia
2.	January 18	Lab-2 Strain Gage Mounting & Measurements
3.	January 25	Lab-3 Uniaxial Testing, Material Properties
4.	February 1	Lab-4 Torsional Testing, Shear Modulus
5.	February 8	Lab-5 Stresses & Strains in Beams
6.	February 15	Lab-6 Photoelastic Analysis Stresses in Beams
7.	February 22	Lab-7 Beam Deflection Measurement
8.	March 1	Lab-8 Introduction to FEA
9.	March 8	Lab-9 FEA of a Truss
10.	March 15	Spring Break
11.	March 22	Lab-10 FEA of Beams
12.	March 29	Lab-11 FEA of 2-D Components
13.	April 5	Lab-12 FEA of 2-D Components & Stress Concentration
14.	April 12	Lab-13 FEA of a 3-D Structure (ANSYS-CAD IGES Interface)
15.	April 19	Make-up/No lab
16.	April 26	No lab

General Rules Pertaining to Labs and Lab Reports
1. Laboratory reports are due on the following laboratory period. Late submissions are strongly discouraged and penalized.
2. The reports are to be prepared according to the format described in the laboratory manual.

Course Evaluation
30% - Mid-term exams (2 exams, to be announced)
20% - Quizzes (6-8 unannounced quizzes)
30% - Final exam
20% - Lab Reports (Report format is provided in the laboratory manual)
0% - Home works (a list of homework problems will be posted at the class web-site; students are expected to solve the assigned problems following each class)

Grading Policy
A: above 85% B: 75 – 85% C: 65 – 75% D: 55 – 65% F: Below 55%

Attendance
Class attendance is expected but not recorded. It will be assumed that information disseminated in class has been received by all students. Laboratory attendance is expected, will be recorded, and will be reflected in grading and evaluation. Late submission of assigned work or make-up examinations will be allowed only if accompanied by an approved University excuse.

Accessibility
The policy of Auburn University is to provide accessibility to its programs and activities, and reasonable accommodation for persons defined as having a disability under Section 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act of 1990. Students needing special accommodations should see the instructor as soon as possible, or contact the Students with Disabilities Program office at (334) 844-5943 (Voice/TT).

Academic Honesty

All portions of the Auburn University Student Academic Honesty Code, as found in the *Tiger Cub* and defined in the SGA Code of Laws, Title XII, will apply in this class.