THE UNIVERSITY OF ALABAMA
Department of Aerospace Engineering and Mechanics
AEM 250-Mechanics of Materials

Course Coordinator: Dr. M. E. Barkey

Textbook Information:
Mechanics of Materials, 3rd Edition. by Roy R. Craig, Jr., Published by Wiley
(Various formats are available, including e-book editions).

Office Hours: To be announced in class.

Prerequisite: AEM 201 Statics
Corequisite: MA 227 Calculus III

Course Description:
Concepts of stress and strain; analysis of stresses and deformation in bodies loaded by
axial, torsional, and bending loads; combined loads analysis; statically indeterminate
members; thermal stresses; columns; and thin-walled pressure vessels.

Objectives:
The primary purpose of this course is to introduce engineering students to the stress,
strain, and deformation behavior of engineering materials and structures. The secondary
purpose of this course is to introduce the students to the mechanics of materials method
of problem formulation and solution procedures for solving solids mechanics problems.
Basics of engineering design are brought into the course by way of selected homework
problems and/or a formal design project.

Outline of Topics:
1. Uniaxial normal stress, normal strain, and axial deformation behavior. (5 hours)
2. Stresses on an inclined plane in an axial deformation member. (1 hour)
3. Uniaxial and multiaxial stress-strain relations. (3 hours)
4. Shear stress and shear strain. (1 hour)
5. Thermal stresses and misfits. (1 hour)
6. Torsion of prismatic bars and systems of bars. (3 hours)
7. Equilibrium of beams including shear and moment diagrams. (4 hours)
8. Review of moments of inertia of plane cross-sections. (1 hour)
9. Stresses and strains from beam flexure and transverse shear. (4 hours)
10. Deflection of prismatic beams. (4 hours)
11. Stress and strain transformation including Mohr’s Circles of stress and strain. (6 hours)
12. Pressure vessels and combined loading. (2 hours)
13. Elastic column buckling. (1 hour)
14. Stress concentrations, failure criteria, and fatigue behavior of materials. (3 hours)
15. Design project. (1 hour)
16. Three exams. (3 hours)
Exams and Assignments:

**Homework:** Every assigned set of homework problems is due at the beginning of the next lecture class. It will not be accepted late. It will normally be returned at the next class meeting. One problem from each homework set will be randomly selected and graded. Copying homework solutions from other student papers or a solution manual and turning it in as your own work is dishonest and constitutes grounds for charges of academic misconduct.

**Regular Exams and Final Exam:** There will be three (3) 50-minute exams. The time limit of 2-1/2 hours for the final exam will be strictly enforced. Exams that are missed will be made up only at the option of the instructor and only when an acceptable excuse is provided. All exams are comprehensive to the date on which they are given, and are closed-book and closed note exams.

<table>
<thead>
<tr>
<th>Grading Policy:</th>
<th>The final course grade is determined as follows:</th>
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</thead>
<tbody>
<tr>
<td>Project* (Note Attendance policy.)</td>
<td>5%</td>
</tr>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Scheduled Regular Exams</td>
<td>50%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>35%</td>
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*In the summer term, there will be no Project, and the points assigned to the project will be distributed proportionally among the Homework, Regular Exams, and Final Exam.

**Attendance:**
Attendance at all class meetings is expected. Unexcused absent students on the Project day will receive a grade of zero for the project.

**Tutors:**
A member of the department staff may be available for tutoring. To be announced.

**Make-up Classes:**
In the event a scheduled class is cancelled due to inclement weather, etc., the homework assignment will be doubled up at the next scheduled class meeting. In the event that an exam is missed due to class cancellation, the exam will be given two class periods after returning.

**Electronic Communication:** Students are expected to check their University e-mail account regularly throughout the semester for information regarding the course. Other email systems will not be used.

**Wireless Devices:** Cell phones, pagers, and other wireless devices must be set to silent or otherwise disabled before the start of class.
**Academic Honor Code**

All students in attendance at The University of Alabama are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University of Alabama expects from its students a higher standard of conduct than the minimum required to avoid discipline. At the beginning of each semester and on tests and projects at the discretion of the professor, each student will be expected to sign an Academic Honor Pledge. The pledge reads as follows:

I promise or affirm that I will not at any time be involved with cheating, plagiarism, fabrication, or misrepresentation while enrolled as a student at The University of Alabama. I have read the Academic Honor Code, which explains disciplinary procedures that will result from the aforementioned. I understand that violation of this code will result in penalties as severe as indefinite suspension from the University.

**Activities considered a violation of the Academic Honor Code**

Activities that violate the academic honor code include, but are not limited to the following:

- copying homework solutions from other students, solution manuals, or websites,
- copying or looking at another student’s exam during the testing period,
- altering a returned examination in an attempt to get additional points.

AEM 250 students that violate the academic honor code will be promptly referred to the College of Engineering Academic Misconduct Monitor.
Severe Weather Protocol:
In the case of a tornado warning (tornado has been sighted or detected by radar; sirens activated), all university activities are automatically suspended, including all classes and laboratories. If you are in a building, please move immediately to the lowest level and toward the center of the building away from windows (interior classrooms, offices, or corridors) and remain there until the tornado warning has expired. Classes in session when the tornado warning is issued can resume immediately after the warning has expired at the discretion of the instructor. Classes that have not yet begun will resume 30 minutes after the tornado warning has expired provided at least half of the class period remains.

UA is a residential campus with many students living on or near campus. In general classes will remain in session until the National Weather Service issues safety warnings for the city of Tuscaloosa. Clearly, some students and faculty commute from adjacent counties. These counties may experience weather related problems not encountered in Tuscaloosa. Individuals should follow the advice of the National Weather Service for that area taking the necessary precautions to ensure personal safety. Whenever the National Weather Service and the Emergency Management Agency issue a warning, people in the path of the storm (tornado or severe thunderstorm) should take immediate life saving actions.

When West Alabama is under a severe weather advisory, conditions can change rapidly. It is imperative to get to where you can receive information from the National Weather Service and to follow the instructions provided. Personal safety should dictate the actions that faculty, staff and students take. The Office of Public Relations will disseminate the latest information regarding conditions on campus in the following ways:

• Weather advisory posted on the UA homepage
• Weather advisory sent out through Connect-ED--faculty, staff and students (sign up at myBama)
• Weather advisory broadcast over WVUA at 90.7 FM
• Weather advisory broadcast over Alabama Public Radio (WUAL) at 91.5 FM
• Weather advisory broadcast over WVUA 7. WVUA 7 Storm Watch provides a free service you can subscribe to that allows you to receive weather warnings for Tuscaloosa via e-mail, pager or cell phone. Check http://www.wvua7.com/stormwatch.html for details.
Disability Statement:
If you are registered with the Office of Disability Services (ODS), please make an appointment with me as soon as possible to discuss any course accommodations that may be necessary.

Students that are registered with ODS should immediately schedule their final exam with ODS. The final examination schedule published by the registrar’s office should be consulting when scheduling the exam.

If you have a disability, but have not contacted the Office of Disability Services, please call 348-4285 or visit 133-B Martha Parham Hall East to register for services.

Students who may need course adaptations because of a disability are welcome to make an appointment to see me during office hours. Students with disabilities must be registered with the Office of Disability Services, 133-B Martha Parham Hall East, before receiving academic adjustments.

Course Web-Site: Sample problems, homework handouts, and additional course policy information can be found at http://mbarkey.eng.ua.edu. Students are responsible for examining this material on a regular basis and bringing handouts with them at the appropriate times.

Disclaimer:
Assignment sheets and course content are subject to modification when circumstances or sound pedagogy dictate and as the course progresses. If changes are made, you will be given due notice.

See http://mbarkey.eng.ua.edu for additional course policies and more course information.