MECH 3334: Mechanical Design


Software: MATLAB, https://my.apps.utep.edu/

References: Mechanical Behavior of Materials, 4th Ed., Norman E. Dowling
Mechanics of Materials, R.C. Hibbeler

Class/Lab Meeting: TR, 3:00 pm to 4:20 pm

Class Room: Physical Science Building 208

Prerequisite: MECH 2322 - Mechanics of Materials

Instructor: Dr. Calvin M. Stewart, Ph.D., cmstewart@utep.edu
Phone: 915-747-6179
Office: ENG A117
Office Hours: TR, 1:45-2:45 pm, or by appointment.

Course Objectives

At the end of the course, students will learn how to design, build, and test a mechanical design based on the principles of mechanical engineering. Specifically, students will be able to:

1. Identify the appropriate material and safety factors for a mechanical design;
2. Perform stress analysis under axial, torsion, bending, transverse, and multiaxial loading;
3. Identify and apply the appropriate Static Failure theory for a ductile or brittle material;
4. Identify and apply the appropriate Dynamic Failure theory for a ductile or brittle material;
5. Apply stress analysis, static failure, and dynamic failure theories to mechanical design problems.

Topics Covered

1. Introduction (Chapter 1)
2. Materials (Chapter 2)
3. Load and stress analysis (Chapter 3)
4. Failures resulting from static loading (Chapter 5)
5. Failures resulting from variable loading (Chapter 6)
Grades

Your final grade for this course will be based on the following activities:

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>5%</td>
</tr>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade Scale</th>
<th>Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-90%</td>
<td>A</td>
</tr>
<tr>
<td>89-80%</td>
<td>B</td>
</tr>
<tr>
<td>79-70%</td>
<td>C</td>
</tr>
<tr>
<td>69-60%</td>
<td>D</td>
</tr>
<tr>
<td>&lt;60%</td>
<td>F</td>
</tr>
</tbody>
</table>

The instructor reserves the right to revise this grading plan.

Homework

Homework assignments are listed in the course schedule (see separate file). Homework is to be written in a notebook and completed individually. Notebooks are checked at the beginning of each exam. Notebook grades will be input after the final exam. It is recommended that students maintain a digital copy of the notebook.

Exams

Exam dates are listed in the course schedule; however, dates are subject to change. All exams are open book and closed notes. Electronic devices (e.g. laptops, tablets, cell phones, etc.) are not permitted. Hoodies must be down. Hats must be turned backwards. To receive full credit on the exam, the exam problem solution must conform to the following structure:

1. **Knowns/Unknowns:** List the given parameters. List the parameters you must find.
2. **Free Body Diagram:** Draw a neat FBD that includes arrows with arrowheads, dimensions, and all the parameters needed to solve the problem. (When appropriate).
3. **Assumptions:** List any assumptions made, and the equations you will need.
4. **Steps:** Give necessary details so that people can easily follow your calculations. Answers without the steps will not be accepted.
5. **Equations:** label each equation with a number (1), (2), (3), etc.
6. **Answer:** Include units and box your final answers.
7. **Neatness:** Disorganized, incomplete, and/or copied work will be penalized.
Calculators

Graphing calculators are allowed. Answers without the fully worked out solutions will receive a zero.

Study Guide

Read the text to be discussed prior to the scheduled class and review the subject thoroughly after the class. Read the textbook carefully. Work on all examples given in the text and solve as many unassigned problems as you can. Expect to spend 6 to 9 after-class hours each week on the subject. Establish a good studying habit and you will do very well in the class.

Academic Honesty

During exams and quizzes, you are not allowed to use any form of wifi enabled electronic device, including cell phones or other electronic communication devices or methods (wrist watches, earbuds, etc.). No wrist watch or other electronic device may be worn.

As a part of the zero-tolerance policy, if you have a cellphone or other electronic device capable of communication on your person; or if any proctor sees or hears any electronic device during the exam or if you share your work with someone else, you will be reported to the proper authorities and you may receive a zero on the exam and an F in the class. Other actions including suspension may also be pursued.

If anyone leaves the exam room during an exam they must be accompanied by a proctor. This includes restroom breaks.

University approved recording devices may also be located at various locations in the room and may be out of sight of the students. These recordings will be managed according to the UTEP approved regulations for such media.

If you are suspected of scholastic dishonesty you may not be directly confronted about your conduct by the instructor or proctor. You will however, be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) and your exam will not be admissible. Your grade in the class may not be available until OSCCR makes a final ruling, this may adversely impact your ability to enroll in other classes.

If you arrive more than 15 minutes late to an exam, you will not be allowed to take the examination.

There will be no makeup exams administered. If you have a university approved excuse, your instructor will have a process for determining how to handle the missing grade outlined in the syllabus. However, no makeup exams will be given.

If you miss more than one exam, the instructor may choose to administratively drop you from the class. This may adversely impact a visa and financial aid.
Any food or drink brought into the examination room is subject to careful inspection by a proctor.

Departmental policy allows for the use of assigned seats. All students must present their UTEP issued ID prior to and during every exam and may be required to sign in. Not having a UTEP issued ID when asked will result in forfeiture of the exam.

Scholastic dishonesty on homework, lab assignments and all other class assignments will be held to the same standards and requirements of academic honesty as quizzes and exams.

**Class Attendance Policy**

Attendance is mandatory. Anyone with 5 or more absences will be dropped from the class. A drop for not attending will count toward the State Allowed Six Drop Limit. If you are failing the class at the time of the drop you may also be given a WF designation. Be advised that a drop could adversely impact visa status, financial aid and other programs.

As per UTEP rules, you may be asked to show a UTEP ID at any time during class. Anyone who is present and not registered in the class will be subject to disciplinary action unless the instructor gives prior approval.

**Excused Absence for Exams**

The UTEP catalog allows Exam Absence to be excused ONLY for University-Recognized Activities and very specific other situations. Medical absence is NOT allowed in the UTEP catalog. For consistency with the catalog, students will NOT be excused from exams due to illness.

**Harassment Policy**

The department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment; but repeated questions about a grade or an administrative decision are.

- Grades are NOT negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.

- Remaining in an office after the occupant requests you leave is considered harassment and potentially threatening. You will be reported immediately without warning and depending on the severity, may be reported to law enforcement.
• Similar behavior towards department staff, and student advisors will also be treated as harassment, including persistent phone calls, emails, and badgering. Department staff and student advisors are there to help students, and should be treated with due respect.

Course Drop

It is the student’s responsibility to officially drop a course that s/he no longer wishes to take before the course drop deadline. Failure to do so WILL result in a grade of “F” on the student’s academic record. If you fall behind, do not give up and quit attending without dropping the course first. Athletes must receive permission from the Miner Athletic Advising Center before dropping a course. International students with F or J visas must receive permission from the Office of International Programs before dropping a course.

Disability and Accommodations

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

Class Schedule

(See separate file)

The above schedule, policies, and assignments in this course are subject to change in the event of extenuating circumstances or by mutual agreement between the instructor and the students.