

# Syllabus for MECH 2322 Mechanics of Materials Spring 2016

## Overview

Mechanics of materials, a.k.a. strength of materials, is one of the fundamental classes in mechanical engineering curriculums. The overall goal of this course is to develop an understanding of the mechanical behavior of structures under different types of loading conditions. The main focus is to mathematically model and determine 1) the stresses and 2) the deformations in a deformable body under load. A significant percentage of mechanical engineers will work primarily on component and system designs, utilizing the concepts learnt in this course. The ability to determine the size and shape of parts to ensure that the stresses and/or deformations do not approach or exceed the load carrying capacity of the material is a very important aspect for a design engineer. Therefore, the ability to calculate stresses, strains and deformations in simple structural elements is essential, and will be learnt in this course.

The following load types will be learnt: axial, shear, torsion, flexure (beam) and simple combinations of these load types, column buckling and other more specialized load types.

## Course Information

**Instructor:** Yirong Lin, Ph.D.

**Email:** [ylin3@utep.edu](mailto:ylin3@utep.edu)

**Office Hours:** TRs 2 to 3 pm

**Office:** Engineering Annex, A-111

**Textbook:** "Mechanics of Materials", by Russell C. Hibbeler (9<sup>th</sup> edition w/ Mastering Engineering)

**Prerequisites:** MECH 1321 or CE 23 Statics with a C or better

**Meeting Times:** T, TH 4:30-5:50 pm, BUNS 313

## Course Objectives

At the end of this class the typical students should be well prepared in the following areas:

1. Identify and solve basic axial, shear, torsion and beam bending stress analysis and deflection problems.
2. Solve simple combined loading stress analysis and deflection problems.
3. Have a good understanding of stress and strain components, stress transformation in 2D and 3D.
4. Solve statically indeterminate problems
5. Column buckling
6. Ability to resolve internal tractions(stresses) with properly chosen F.B.D.s

## Course Policies

*Grading:* The grade in this class will be based on 3 midterm exams during the semester, 3 quizzes, and 1 final project. The grade will be computed as follows:

## Final grade calculation:

$$\text{Final Score} = 0.2 \text{ Quizzes} + 0.5 \text{ Midterm Exams} + 0.3 \text{ Project}$$

**Tentative** division for letter grade is as follows:

$$\begin{aligned}90 &\leq A \leq 100 \\75 &\leq B < 90 \\55 &\leq C < 75 \\40 &\leq D < 55 \\F &< 40\end{aligned}$$

**Exams:** Exams will be announced well in advance so that there is no excuse for missing an exam. There will be three midterm exams and a final. **There will be no make-up exams given!**

**Quiz:** Quizzes will be assigned on Mastering Engineering, and students are expected to solve them and submit during the specified time outside of class. **There will be no make-up quizzes given!**

**Homework:** 8-10 Optional Homework problem sets will be assigned as practice problems. These will not be graded.

**The trick to doing well in this class is to do many problems; there really is no other way to do well. Also, you need to focus on understanding the fundamental concepts in solving the homework and not just rote memorization of the particular problems approach.**

1. Chapter 1: Stress  
Hibbeler 1.2, 1.3, 1.4, 1.5, 1.6
2. Chapter 2: Strain  
Hibbeler 2.1, 2.2
3. Chapter 3: Materials  
Hibbeler 3.1, 3.2, 3.4, 3.6, 3.7
4. Chapter 4: Axial  
Hibbeler 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7
5. Chapter 5: Torsion  
Hibbeler 5.1, 5.2, 5.3, 5.4, 5.5
6. Chapter 6: Bending  
Hibbeler 6.1, 6.2, 6.3, 6.4, 6.5
7. Chapter 7: Transverse shear in bending  
Hibbeler 7.1, 7.2, 7.3
8. Chapter 8: Combined loading  
Hibbeler 8.1, 8.2

**Tentative Exam Dates (exact dates will be announced on Blackboard during the semester):**

**Quiz:** Quiz 1 (02/16/16), Quiz 2 (03/15/16), Quiz 3 (04/14/16)

**Exam:** Exam 1 (02/18/16), Exam 2 (03/17/16), Exam 3 (04/19/16)

**Project:** 05/03/16.