



# WISCONSIN

## UNIVERSITY OF WISCONSIN-MADISON

University of Wisconsin - Madison  
College of Engineering [EGR]  
Last Offered: 2015 Spring [1154]  
Direct Link to this Syllabus :

<http://aefis.engr.wisc.edu/index.cfm/page/CourseAdmin.ViewABET?coursecatalogid=82&pdf=True>

1. **M E 306, Mechanics of Materials**
2. **Credits : 3 Contact Hours : 2.5**
3. **Textbook and Materials :** Mechanics of Materials; Beer, Johnston; 6; 2012  
Mechanics of Materials; Beer, Johnston; 6th; 2012
4. **Specific Course Information :**
  - a. **Brief description of the content of the course (Course Catalog Description) :** Mechanical stress and strain, deformation under tension and compression, torsion of shafts, beam bending stresses and deflections, design of beams and shafts, pressure vessels, principal stress and strain, buckling, impact, strain energy analysis.
  - b. **Pre-requisites or Co-requisites :** EMA 201, Math 222
  - c. **This is a Required course.**

- **Specific Goals for the Course :**

- a. **Course Outcomes :**

1. This course is the foundation to many advanced techniques that allow engineers to design machine components, mechanisms, predict failure and understand the physical properties of materials. Mechanics of Materials gives the student basic tools for stress, strain and deformation analysis. Methods for determining the stresses, strains and deformations produced by applied loads are presented. Engineering design concepts are integrated throughout the course.
2. Analyze and design components and structural members subjected to tension, compression, torsion, bending and combined loads using fundamental concepts of stress, strain, elastic and inelastic behavior.
3. Recognize the nature of a components loading, classify its response and determine where supplemental material can be found to aid in analysis of its response.
4. Communicate the results and conclusions of mechanics analyses effectively.

- **ABET Student Learning Outcomes :**

- (a) Ability to apply mathematics, science and engineering principles.
- (e) Ability to identify, formulate and solve engineering problems.
- (k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- **Brief List of Topics to be Covered :** Stress and strain;  
Elastic and plastic behavior of materials;  
Thermal strain and stress;  
Axial loading;  
Torsional loading;  
Bending moment loading;  
Beam response due to transverse loading;

Beam deflections;  
Combined loading;  
Stress and strain transformation;  
Column buckling;  
Strain energy and impact loading