MEC 132
Mechanics II - Strength of Materials for Engineering Technology

Faculty Name:
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MEC 132
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COURSE OUTLINE

Prerequisites:

Prerequisite: MEC 131

Course Description:

MEC 132 Mechanics I – Mechanics II - Strength of Materials for Engineering Technology (3 CR) Prerequisite: MEC 131. This course introduces the concepts of stress and strain. Provides an analysis of stresses and deformations in loaded members, connectors, shafts, beams, columns, and introduces combined stress states.

Semester Credits: 3 Lecture Hours: 3 Lab/Recitation: Hours: 0

Course Outcomes

At the completion of this course, the student should be able to solve problems concerning the application of external forces on structural components:

Building on the use of Newton's laws to solve for internal forces and stresses forces in two-dimensional problems.

1. Understand the definitions of and the types of stress and strain.
2. Determine the size of members to resist forces in both strength and deflection.
3. Be able to use physical material properties to select appropriate materials for design problems.
4. Understand the modes of failure and how to size to prevent those failures.
5. Use a computer program to determine deflections and stresses a system is under due to loading.
6. Determine the moment of inertia to use in calculations involving the stresses induced in a member by outside forces.
7. Understand the difference in short, medium, and long columns and be able to select the proper sizing calculation.
8. Be able to combine components of stress to determine the maximum values for design use.
9. Complete simple sizing of machine and structural parts.

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Required Materials:

1. Scientific calculator
2. Engineering graph paper for problem solving.

Textbook:

Statics and Mechanics of Materials, 2nd edition by Hibbeler, Pearson, 4th Ed., ISBN: 9780133451603

The following supplementary materials are available:

1. Problem answer guide on reserve for checkout on second floor of LRC

2. Digital resources of how to solve specific problems related to Statics are available on BlackBoard.

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Week 1	**Introduction to class, review of Chapter 8 and Introduction to Chapter 9.** **Ch 8 – Area Moments of Inertia Sections 8-1 to 5.** **Ch 9 - Simple Stresses Sections 9-1 to 3.**
Week 2	**Ch 9 - Simple Stresses Sections 9-4 to 7.**
Week 3	**Ch 10 – Strains Sections 10-1 to 10-8.**
Week 4	**Ch 11 - Mechanical Properties of Materials Sections 11-1 to 8.**
Week 5	**Ch 12 - Torsion of Circular Shafts Sections 12-1 to 6.**
Week 6	**Ch 13 - Shear Forces and Bending Moment Diagrams Sections 13-1 to 9.**
Week 7	**Ch 14 - Stresses in Beams Sections 14-1 to 9.**
Week 8	**Ch 15 - Design of Beams for Strength Sections 15-1 to 5.**
Week 9	**Ch 16 - Deflection of Beams Sections 16-1 to 3.**
Week 10	**Ch 16 – Deflection of Beams Section 16-4.** **Ch 18 Combined Stresses Section 18 -1 to 2.**
Week 11	**Ch 18 Combined Stresses Section 18 - 4 to 5.**
Week 12	**Ch 18 Combined Stresses Section 18 - 6 to 8.**
Week 13	**Ch 19 Columns Sections 19-1 to 4.**
Week 14	**Ch 19 Columns Sections 19-5 to 7.**
Week 15	**Ch 20 Connections Sections 20.1 – 6.** Topics in machine and structure design.
Week 16	**Final Exam**

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Notes to Instructors

1. Instructors should use Excel to demonstrate as many problem solutions as appropriate. In addition, online or downloadable software (MDSolids) can be used to supplement solution of problems. Autodesk® ForceEffect™ can be used to demonstrate analysis of static structures and machines.

2. The solution guide is available for student use in the reserve area of the LRC.

3. Concepts should be demonstrated as possible through the use of projects. A common type of project is a bridge building and analysis competition.

4. Industry standards and applications should be stressed. Failures in the analysis of engineering problems can be used to demonstrate the need for proper force determination. The Hyatt Walkway Failure: http://en.wikipedia.org/wiki/Hyatt_Regency_walkway_collapse

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