

University of Toledo

Mechanical Engineering Technology

Master Syllabus

Course Title: *Strength of Materials for Technology* **Course Code & Number:** *MET 2120*

Credit Hour Total: 4

Lecture Contact Hours: 3 **Lab Contact Hours:** 2

Prerequisite(s): *MET 2100*

Text: *Statics and Strength of Materials, by Fa-Hwa Cheng, 2nd Edition, 1997*

Software: *none*

Course Description: (Approved Catalog Description)

Introduction to the study of stress distribution and deformation of elastic materials due to applied loads. Consideration of stress, strain, compression, tension, shear, torsion, moments and combined loading in basic machine elements.

Related Program Outcomes:

- Outcome a.* Students will demonstrate the ability to select and apply the knowledge, techniques, and skills to broadly defined ET activities in this area
- Outcome c.* Will have the ability to conduct experiments and modify mechanical components.
- Outcome f.* Students will have ability to identify, analyze, and solve broadly defined ET problems.

Course Objectives:

Upon completion of this course, the student will be able to:

1. Study the stress and strain distributions in materials subjected to compressive, shear, tensile, bending, and torsion loadings.
2. Discuss riveted joints and weldments and determine their stress loadings.
3. Analyze beams for failure in flexure.
4. Analyze beams for failure by buckling.
5. Perform beam design for discrete and uniform loadings.
6. Perform column design for centrally loaded columns.
7. Conduct laboratory experiments to measure material properties.

Course Outline:

- Stress due to tensile load on bars
- Strain due to tensile load on bars
- Study of other properties of materials
- Stress and strain due to torsion on bars
- Shear, bearing, and tensile stress in riveted joints
- Stresses in welded joints
- Moment of a discrete force
- Moment of a uniformly distributed force
- Flexural stresses in beams
- Beam deflection computation
- Moment Axis Theorem
- Stress due to combined loadings
- Euler formula for buckling beams
- AISC formulas for buckling beams

Laboratory Topics:

- Using Excel spreadsheet for tensile test
- Tensile test
- Using Excel spreadsheet for riveted joints
- Determination of riveted joint strength and welded joint strength
- Using Excel spreadsheet for deflection of a beam
- Beam bending
- Torsion test