



## ME213 Mechanics of Materials Lab (Required Course)

**Code and Name:** ME213 Mechanics of Materials Lab

**Credit Hours:** 1 (Lecture: 0, Tutorial: 1, Lab./Practical: 2)

**Textbook:**

- Mechanics of Materials, Timothy A. Philpot, 2<sup>nd</sup> Edition, John Wiley & Sons, Inc., 2011

**Other References:**

- Fundamentals of Materials Science and Engineering, William D. Callister, and David G. Rethwisch, 4<sup>th</sup> Edition, John Wiley & Sons, Inc., 2013.

**Course Description:**

Material testing against tension, compression and impact testing, investigations of Hooke's law, strain gages measurements of deflection, phenomena of bending, phenomena of hardness via its different tests and theory of torsion and deflection. Phenomena of creep and its effect on temperature. Dynamic testing of materials like fatigue.

**Pre-requisites:** Materials Science and Engineering ME 211.

**Co-requisites:** None

**Course Learning Outcomes:**

With relation to ABET Student Outcomes (SOs: 1-7)

1. Describe various material properties on the basis of static and dynamic testing (1, 6)
2. Describe the torsion phenomena in rods (1, 6)
3. Describe the deflection phenomena in beams (1, 6)
4. Prepare the experiments as explained and analyze problems related to experiment (1)
5. Compare the measurement values with the theoretical results (1)
6. Show responsibility by submitting the lab reports timely in an effective and professional way (3, 4)
7. Operate the latest relevant computer programs for report writing and data analysis (1, 2, 6)
8. Illustrate the proper background of testing equipment and procedures keeping in view human and equipment safety. (1, 2, 6)

**Topics to be covered:**

- Introduction to Mechanics of Materials lab and Presentation about writing of lab reports.
- To compare the extensions of two springs with the help of Hooke's Law.
- To study the influence of specimen material and notch shape on notched bar impact work.
- To determine various mechanical properties for different materials by tensile test using Universal Testing Machine.
- To measure the compressive strength of a cylinder using Universal Testing Machine.
- To determine the Hardness of the given specimen through Rockwell's, Brinell's, and Vickers Hardness test using Universal Hardness Testing Machine.
- To draw the S-N diagram by using fatigue testing machine.
- To study the effect of surface qualities on fatigue.
- To investigate the relationship between torque and twist of various specimens using torsion testing apparatus.
- To study the phenomenon of deflection on various materials using deflection testing apparatus.
- To determine the flexure strength of various materials by using Universal Testing Machine.

**Grading Policy:**

The grading for the course are 60% coursework and 40% Final Exam. The course work consists of one Midterm Exam worth 20%. The remaining 40% grading is for lab report.

