A. **TITLE:** Materials Testing Laboratory

B. **COURSE NUMBER:** MECH 221

C. **CREDIT HOURS:** 1

D. **WRITING INTENSIVE COURSE:** Yes

E. **WEEKS PER SEMESTER:** 15

F. **SEMESTER OFFERED:** FALL

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:** 3 laboratory hours per week

H. **CATALOG DESCRIPTION:**

The course provides hands on experimentation in material testing as it relates to material properties for ferrous and nonferrous metals, concrete, plastics and wood. Technical report writing that meets industrial accepted standards is required.

I. **PRE-REQUISITE:** ENGS101

J. **GOALS (STUDENT LEARNING OUTCOMES)**

By the end of this course, the student will be able to:

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<th>Course Objective</th>
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| 1. Collect, organize and report data using spreadsheet software for data analysis | 1. Communication  
2. Critical Thinking  
3. Professional Competence  
4. Inter-Intrapersonal Skills |
| 2. Write technical reports that meet industrial accepted practice | 1. Communication  
2. Critical Thinking  
3. Professional Competence  
4. Inter-Intrapersonal Skills |
| 3. Conduct material testing to ASTM standards and verify theoretical equations | 1. Communication  
2. Critical Thinking  
3. Professional Competence  
4. Inter-Intrapersonal Skills |
| 4. Build team working skills and explain technical data in oral presentations | 1. Communication  
2. Critical Thinking  
3. Professional Competence  
4. Inter-Intrapersonal Skills |

K. **TEXTS:** N/A
L. **EQUIPMENT:** UTM, torsion tester, concrete compression tester, impact tester, heat treatment ovens, beam bending, metallography microscope and polishing station,

M. **GRADING METHOD:** A-F

N. **MEASUREMENT CRITERIA/METHODS:**
   1. Class/team participation
   2. Experimentation and test setup
   3. Oral presentation
   4. Technical written reports related to experimental data

O. **DETAILED TOPICAL OUTLINE:**

I. Library Research on ASTM standards
II. Hardness Test (Brinell, Rockwell B,C) and tensile strength prediction
III. Tensile Test of Steel (hot rolled vs. cold rolled)
IV. Tensile Test of Aluminum (2011-T4 vs. 6061-T6)
V. Tensile Test Cast Iron
VI. Tensile Test Plastics
VII. Compressive Test Concrete
VIII. Shear Test (direct and torsional) (steel vs. aluminum)
IX. Impact Test
X. Cold working aluminum
XI. Hardenability Test (Jominy End-Quench 1018, 1095, 4140)
XII. Heat Treatment of Tool Steel
XIII. Metallography
XIV. 3 point/ 4 point bend test on brittle material
XV. Compression test on wood
XVI. Bend test of wood