1. Course number and name  
**EML 3012C Mechanics and Materials II**

2. Credits and contact hours  
3 cr, 4.25 contact hours (2 hrs. 30 min. lecture, 1 hr. 45 min. lab)

3. Instructor’s or course coordinator’s name  
Instructor: Dr. Peter Kalu, Coordinator: Dr. William Oates

4. Text book, title, author, and year  
- Materials Science and Engineering: An Introduction w/ CD, Callister, W. D., Jr., 2010  
- Writing Style and Standards in Undergraduate Reports, Jeeter, S. and Donnell J., 2011 (recommended)  
- Mechanics of Materials, Hibbeler, R. C., 2011 (recommended)

5. Specific course information  
   a. *brief description of the content of the course (catalog description)*  
      This course is the second part of a two-part sequence, integrating mechanics and principles of materials science. Emphasis is on measurement techniques and experimental methods in solid mechanics and materials science. Topics covered include tensile, impact, torsion, fatigue and combined loading; beams in bending; structures of steel; and other concepts learned in mechanics of materials and materials science. This course also gives the students an insight into technical report writing techniques.  
   b. *prerequisites or corequisites*  
      Prerequisites: EML 3011C and PHY 2049C  
      Corequisite: EML 3234  
   c. *indicate whether a required, elective, or selected elective course in the program*  
      Required course

6. Specific goals for the course  
   a. *Course Outcomes*  
      By the end of the semester, students should be able to  
      1. Prepare effective technical reports and analyze real life experimental data [1, 2]  
      2. Perform experimental set-up for mechanics and materials and perform data analysis [1, 3]  
      3. Relate mechanical and materials properties to experimental analysis and real life situations [1, 4]  
      4. Apply Free Body Diagram & Force Equilibrium to analyze force balance, given a structure or machine [5]  
      5. Delegate responsibilities among team members to perform experiments and write/present a group report [6]  
         Numbers refer to Course Objectives below, e.g. for course outcome 1, [1, 2] refers to course objectives 1 and 2.  
   b. *Course Objectives and Relation to Student Outcomes*  
      1. To provide an overview of Experimental Techniques in Mechanics and Materials through a number of laboratory experiments and projects [5]  
      2. To provide an overview of report writing and the ability to write effective technical papers [7]  
      3. To introduce basic error analysis and statistical techniques [1, 5]
4. To introduce materials properties in terms of Elasticity, Fracture, Fatigue, Ductility, Strength, Stiffness and to introduce the concept of materials design and materials selection for a set of structural and mechanics applications [1, 2, 5]
5. To introduce the concept of principal stresses in a combined loading configuration and perform Mohr's circle analysis and link these concepts to failure criteria [1, 5, 7]
6. To expose the students for a group-learning environment in order to learn effective teamwork skills [4].
Numbers refer to Departmental Student Outcomes, e.g. for course objective 3, [1, 5] refers to student outcomes 1 and 5.
7. Brief list of topics to be covered
   • Lab or Technical Reports
   • Fundamentals of Measurement and Uncertainty
   • Error / Uncertainty
   • Experimentals in Solid Mechanics; Experiment #1 Impact Test
   • Tensile Test
   • Torsion Test
   • Recrystallization
   • Hardness
   • Strain
   • Thin Wall Vessel.
   • Mohr's Circle