**Course number and name**

MTSE 3050 - Mechanical Properties of Materials

**Credits and contact hours**

3 Credits. MW 4:00pm - 5:20pm

**Instructor’s or course coordinator’s name**

Instructor: Dr. Rajiv Mishra

**Text book, title, author, and year**


  a. *Other supplemental materials*
     None

**Specific Course Information**

  a. *Brief description of the content of the course (catalog description)*

     Macroscopic mechanical response of ceramics, metals, polymers and composite materials, with an introduction to the underlying microstructural processes during deformation and fracture.

  b. *Prerequisites or co-requisites*

     ENGR 3450

  c. *Indicate whether a required, elective, or selected elective course in the program*

     Required

**Specific goals for the course**

  a. *Specific outcomes of instruction*
• Students will learn about correlations between microstructure and mechanical properties, e.g. influence of grain size on strength and/or fracture toughness
• Students will be given a recurring homework where they answer the same broad question with greater detail as the semester progresses. The answers will be measured against a mechanism evaluation matrix.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

This course addresses ABET Criterion 3 Student Outcome(s): a, b, e, i, k and Program Outcomes 1, 2, 5, 9, 11.

Brief list of topics to be covered

I. Tensile test (1 week)
II. Tension/Bending/Torsion/Elastic Matrix (1 week)
III. Elastic deformation in isotropic materials, Plane Stress, Plane Strain, Principal Stresses (1 week)
IV. Stress-strain in anisotropic materials, Composites, Strengthening by fiber reinforcement (1 week)
V. Composites (1 week)
VI. Deformation of metallic crystalline materials (2 weeks)
VII. Strengthening crystalline materials (2 weeks)
VIII. High temperature deformation of crystalline materials (1 week)
IX. Fracture mechanics and toughening mechanisms (1 week)
X. Fatigue (2 weeks)
XI. Deformation of polymers/Deformation of non-crystalline materials (1 week)
XII. Deformation of ceramics (1 week)