1. *Course number and name*

**ENGR 309: Mechanics of Materials**

1. *Credits, contact hours, and categorization of credits in Table 5-1 (math and basic science, engineering topic, and/or other).*

3 credits; two 75-minute lectures or three 50-minute lectures per week; engineering topic

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

Zhaoshuo Jiang

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

Beer, F. P., Johnston, E. R., DeWolf, J. T., and Mazurek D. F., Statics and Mechanics of Materials, 2nd edition, McGraw-Hill, 2016 (Recommended, not required).

1. *other supplemental materials*

Supplemental online content (apps, recorded videos, web-based tools, etc.) delivered via course webpage

1. *Specific course information*
2. *brief description of the content of the course (catalog description)*

Shear and bending moment diagrams. Analysis if bending and shear stresses in beams. Stress transformation and failure theories. Deformation of beams. Column buckling. Torsion. Elastic and ultimate resistance of materials.

1. *prerequisites or co-requisites*

Engr 102, Engr 200 concurrently.

1. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*

Required for Civil and Mechanical Engineering.

1. *Specific goals for the course.*
2. *Specific outcomes of instruction.*
* Students will demonstrate an ability to:
* Understand basic mechanical properties of solid materials.
* Stress-strain of brittle and ductile materials.

* Students will demonstrate an ability to:
* Determine internal forces in common civil and mechanical engineering components.
* Obtain stresses in prismatic bars under axial load.
* Obtain stresses in circular shafts due to torsion.
* Obtain stresses in prismatic beams due to bending loads.

* Students will demonstrate an ability to:
* Transform stresses from one set of axes to another.
* Use Mohr’s circle to transform stresses.

* Students will demonstrate an ability to:
* Compute deformation of beams under bending.
* Compute deformation of torsional members.
* Compute deformation of columns under axial load.

* Students will demonstrate an ability to:
* Compute the buckling resistance of axially loaded columns.

1. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*

ABET Student Outcomes: 1, 2, 6

1. *Brief list of topics to be covered*
* Basic concepts of stress and strain
* Stresses in bodies subject to axial, torsional, and pressure loads.
* Forces and stresses in beams.
* Beam deflection.
* Transformation of stress and strain.
* Elastic design.
* Introduction to column stability.