



ENGR 2140

Division: Natural Science and Mathematics

Department: Engineering and Computer Science

Course: ENGR 2140

Title: Strength of Materials

Catalog Description:

ENGR 2140 is designed for engineering majors in their preprofessional program. This course is an introduction to structural analysis and mechanics of materials. Topics treated are: shear force and bending moment diagrams, Hooke's Law, general state of stress, deflections due to load, and stress strain diagrams. Also included are statically indeterminate structures, nonsymmetric bending, and the use of Mohr's Circle to find principal value of stress and strain.

General Education Requirements: N/A

Semesters Offered: Fall

Credit/Time Requirement: Credit: 3; Lecture: 3; Lab: 0

Clock/Hour Requirements: 0

Offered for Non-Credit: No

Prerequisites: Calculus II (MATH 1220), and Statics (ENGR 2010)

Corequisites: N/A

Justification:

This course is designed as a component of the standard preprofessional curriculum in engineering, which enables the student to transfer with junior level status into a four year engineering program. Similar courses are offered in university engineering schools. ENGR 2140 is to be taken during the sophomore year of the preengineering curriculum and will prepare the student for subsequent course work.

Student Learning Outcomes:

Upon successful completion of this course, students will:

- be able to apply previously studied math and engineering skills to solving problems related to the stress and strain found in structural members
- be able to apply the theory of elastic stress and strain as it relates to materials commonly used in structural engineering
- demonstrate the ability to analyze structures and determine the suitability of various materials to be used under the given set of structural conditions
- be prepared to take more advanced courses in mechanics of solids and strength of materials.

Content:

This course will include:

- normal stress and shear stress
- strain
- properties of materials
- Hooke's Law and Poisson's Ratio
- axial loads and statically indeterminate members
- thermal stress
- torsional deformation
- shear and bending moment diagrams
- transverse shear
- stress transformations and Mohr's Circle
- deflection of beams under load
- buckling of columns

General Education Outcomes:

6) Apply computational skills to a variety of contexts.

Mathematical and computational skills are essential to the success of an engineering student. The student must be able to perform calculations both manually and through the use of computational software.

7) Apply scientific reasoning to a variety of contexts.

Engineering consists of the application of scientific knowledge in order to design devices and systems with a practical purpose. Thus, students must be able to utilize the discoveries of science in the solution of engineering problems.

Key Performance Indicators:

- Daily homework assignments (15-20%), quizzes (5-8%), midterm tests (50-60%), and a final exam will be administered -- all related to the above outcomes. These will be evaluated and recorded.

Representative Text and/or Supplies:

- R. C. Hibbeler, *Mechanics of Materials*, current edition, Prentice-Hall.
- Beer, Johnston, DeWolf, *Mechanics of Materials*, current edition, McGraw-Hill.

Optimum Class Size: 20

Maximum Class Size: 30

Signatures:

I hereby submit this course syllabus:

Garth O. Sorenson, MS, Associate Professor

I hereby find this course consistent with the goals and resources of the Engineering and Computer Science Department:

Garth O. Sorenson, MS, Associate Professor, Chair

I hereby find this course consistent with the goals and resources of the Natural Science and Mathematics Division:

Dan Black, EdD, Associate Professor, Dean

I have discussed the need for library resources related to this class with the person submitting the syllabus:

Lynn Anderson, MLIS, Technical Services Librarian (Main Campus)

Michelle Olsen, MLS, Campus Librarian (Richfield Campus)