Cape Cod Community College

Departmental Syllabus

Prepared by the Department of Natural Sciences and Applied Technology
Date of Departmental Approval: August 28, 2017
Date approved by Curriculum and Programs: October 11, 2017 **Effective: Fall 2018**

1. **Course Number: ENR209**
   Course Title: Strength of Materials

2. **Description:** The study of strength of materials shows the methods of calculating the stresses and strains in structural members such as beams, columns, and shafts. These methods predict the response of a structure when subjected to loading, as well as its susceptibility to various failure modes. The course focuses on types of stresses and strains, thermal effects on material strength, calculation of stresses and strains, normal stress in beams, shear/moment diagrams, and design of simple beams.

3. **Student Learning Outcomes** (instructional objectives, intellectual skills)**:**
   Upon successful completion of this course, students are able to do the following.
   - Differentiate normal and shear stress on a surface.
   - Explain the axial tension test.
   - Calculate stress and strain in axial loading.
   - Demonstrate an understanding of thermal effects on materials.
   - Solve statically indeterminate systems.
   - Define and evaluate the symmetry of shear strain.
   - Evaluate shear stress and angle of twist in torsional loading.
   - Calculate normal stress in beams due to moments.
   - Utilize shear and moment diagrams as analytical tools.
   - Calculate stresses due to shear forces in a beam.
   - Calculate beam deflection by superposition.
   - Design simple beams.

4. **Credit(s):** 4 credits (3 class hours / 2 laboratory hours)

5. **Satisfies General Education Requirement:** No

6. **Prerequisite(s):** ENR201 (Statics)

7. **Semester(s) Offered:** Varies

8. **Suggested General Guidelines for Evaluation:** The course grade is based on homework assignments; class work and participation; one-hour exam(s); and a final examination.

9. **General Topical Outline** (Optional)**:**
   1. Average normal and shear stress on a surface.
   2. Axial tension test.
   3. Stress and strain in axial loading (emphasis on free body diagrams).
   4. Thermal effects.
   5. Solution of statically indeterminate systems.
   6. Definition and symmetry of shear strain.
   7. Shear stress and angle of twist in torsional loading (emphasis on free body diagrams).
   8. Normal stress in beams due to moments.
   9. Shear and Moment Diagrams.
   10. Stresses due to shear forces in a beam.
   11. Calculation of beam deflection by superposition.
   12. Design of simple beams.