Common Course Outline
EGNT 221
Strengths and Materials
3 Semester Hours

The Community College of Baltimore County

Description

EGNT 221 — 4 credits — Strengths and Materials

prepares technicians to design mechanical components and structures, predict failures, and

understand physical properties of materials. The student is introduced to stress and strain

relationships in deformable solids, and analysis of axial members, shafts, beams, columns, and

pressure vessels. Other topics covered include: combined stresses, statically indeterminate

members, and properties of structural materials. Applied rather than theoretical, the course

emphasizes problem solving.

3 credits; 2 lecture hours per week; 2 laboratory hours per week. Prerequisite: EGNT 121

Overall Course Objectives

Upon completion of this course the student will be able to:

1. Calculate moment of inertia for a specific cross section;

2. Analyze various systems and solve for normal axial stress;

3. Analyze various systems and solve for stresses due to abrupt changes in geometrical shape;

4. Analyze various systems and solve for axial strain;

5. Evaluate material properties using stress-strain diagrams;

6. Solve for thermal strain;

7. Apply the concepts of Hooke's Law, and Poissons's Ratio;

8. Calculate torsion stress and angle of twist for structures subjected to twisting loads;

9. Draw shear and bending moment diagrams for various types of beams;

10. Calculate bending stresses or moments at various sections of a beam; and

11. Calculate the deflection of beams under varied loads.

Major Topics

    I. Basic Concepts in Strength of Materials

   II. Design Properties of Materials

  III. Design of Members Under Direct Stress

  IV. Axial Deformation and Thermal Stress

   V. Torsional Shear Stress and Torsional Deformation

  VI. Shearing Forces and Bending Moments in Beams

 VII. Centroids and Moments of Inertia of Areas

VIII. Stress Due to Bending

  IX. Shearing Stresses in Beams

   X. Special Cases of Combined Stresses

  XI. The General Case of Combined Stress and Mohr's Circle

 XII. Deflection of Beams

XIII. Statically Indeterminate Beams

XIV. Columns

 XV. Pressure Vessels

XVI. Connections

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member but will include the following:

A mid-term and final written exam.
A minimum of three laboratory assignments.
A written assignment.

Writing: The individual faculty member will determine specific writing assignments.

Other Course Information

This course is a required course in the Engineering Technology degree.

Individual faculty members may include additional course objectives, major topics, and other course requirements to the minimum expectations stated in the Common Course Outline.