

## TECHNOLOGY 369: Strength of Materials

**2007-08 Catalog Data:** TECH 369 Strength of Materials (3 Credits)

**Catalog Description:** Mechanics of deformable bodies with emphasis on principles of stress and strain; shear and bending moment; torsion, buckling; failure criteria, and design concepts.

**Prerequisites:** MATH 229 and TECH 210

**Co-requisites:** None

**Textbooks:**

- Mechanics of Materials, Beer and Johnston, McGraw-Hill Publishers.

**Instructor:** Cliff Mirman, Ph.D.

Learning Objectives	Relational ABET Learning Outcomes	Performance Assessment
Ability to determine axial and bending stress and strain, as well as torsional stress and strain and Hookes law	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. C. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes. F. An ability to identify, analyze and solve technical problems.	Quizzes, Homework, Laboratory write-ups, tests Class questions
Ability to utilize factor of safety in performing failure calculations	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. C. An ability to conduct, analyze and interpret experiments and applies experimental results to improve processes. F. An ability to identify, analyze and solve technical problems. J. An ability to understand professional, ethical and social responsibilities.	Quizzes, Homework, Laboratory write-ups, tests Class questions
Ability to utilize mathematics and physics properties in solving complex stress/strain problems	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.	Quizzes, Homework, Tests Class questions
Ability to determine material properties both theoretically and experimentally	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. C. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes. F. An ability to identify, analyze and solve technical problems. N. An ability to use modern laboratory techniques, skills, and/or equipment effectively.	Quizzes, Homework, Laboratory write-ups, Tests Class questions

Determination of stress and strain experimentally through use of strain gage and tensile testing	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>C. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.</li> <li>N. An ability to use modern laboratory techniques, skills, and/or equipment effectively.</li> </ul>	<p>Quizzes, Homework, Laboratory write-ups, Tests Class questions</p>
Utilization of the computer in computing stress/strain values	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> <li>M. An ability to program computers and/or utilize computer applications effectively.</li> </ul>	<p>Laboratory write-ups</p>
Knowledge of presentation of theoretical and laboratory data in written laboratory reports	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>C. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.</li> <li>E. An ability to function effectively on teams.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> <li>G. An ability to communicate effectively in writing.</li> <li>N. An ability to use modern laboratory techniques, skills, and/or equipment effectively.</li> </ul>	<p>Laboratory write-ups</p>
Ability to determine principle stresses in both theoretical and experimental form	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>C. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> <li>G. An ability to communicate effectively in writing.</li> <li>N. An ability to use modern laboratory techniques, skills, and/or equipment effectively.</li> </ul>	<p>Quizzes, Homework, Laboratory write-ups, Tests Class questions</p>
Ability to utilize stress and strain information in design tasks	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> <li>J. An ability to understand professional, ethical and social responsibilities.</li> </ul>	<p>Quizzes, Homework, Tests Class questions</p>

**Topics:**

1. Axial Stress
2. Axial strain and deflection
3. Material Properties
4. Torsion
5. Pure Bending
6. Transverse shear
7. Combined Loadings
8. Transformation of Stress and Strain

**Computer Usage:** Students will make use of Excel and Word in the preparation of laboratory reports during the semester. Cad software may also be used to compute engineering problems.