

1. Department, Course Number, and Course Title:

CIVIL & MECHANICAL ENGINEERING

CE/ME312 STRENGTH OF MATERIALS LABORATORY I

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Tests of engineering materials in tension, compression, bending, and torsion; verification by experiment; basic theories learned in strength of materials. Laboratory 3 hours

4. Prerequisites: Course: CE/ME 205 (Strength of Materials I), (may be taken concurrently)
Topics: Hooke's Law; Euler's column buckling; shear, torsional and flexural formulas; stress, strain and theories of failure

5. Text and Materials: Strength of Materials Laboratory Manual, CSULA.

6. Course Objectives: This course provides students opportunities to become familiar with standard mechanical testing methods and fundamental properties of engineering materials, and to develop report writing proficiency.

Course Outcomes

- ability to conduct standard tension tests of steel and other metals
- ability to conduct compression tests of concrete, cast iron and steel
- ability to conduct tests with materials subjected to torsion
- ability to conduct simple tests of column buckling
- ability to use strain gages for strain measurement
- ability to document results in written reports
- ability to work in groups
- ability to work independently

7. Topics Covered: (in Order of Presentation)

- Introduction (1 session)
- Tensile test of mild steel (1 session)
- Tensile test of aluminum and brass (1 session)
- Tensile test of steel-- hysteresis effect (1 session)
- A study on the effects of finishing and varying carbon content on the properties of carbon steel (1 session)
- Direct shear test of steel, brass and aluminum; torsion test of steel and cast iron (1 session)
- Flexure test of an aluminum alloy I-beam (1 session)
- Transverse test of timber, cast iron and plain concrete (1 session)
- Compression test of steel, cast iron and concrete (1 session)
- Column buckling test of timber (1 session)
- Final Examination (2.5 hours)

8. Class Schedule: Number of Sessions per week: 1
Duration of each session: 2 hours 50 minutes

9. Contribution of course to meeting the professional component:

This course is a required laboratory for the civil and mechanical engineering programs.
Engineering Science: 1 unit

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (abet h)
- a knowledge of measurement techniques

Skill outcomes:

- an ability to design and conduct experiments as well as to analyze and interpret data (abet b)
- an ability to function on multidisciplinary teams (abet e)
- an ability to communicate effectively (abet g)
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (abet k)
- an ability to think in a logical sequential process

Attitudes Outcome:

- an understanding of professional and ethical responsibility (abet f)
- a desire to be a flexible and adaptable team player (collaborative attitude)

11. Prepared by: Anjan K. Bhaumik and Stephen F. Felszeghy

05/2005