REGULAR COURSE SYLLABUS

College of: Professional Studies
Department: Engineering and Engineering Technology
Prefix & Course Number: SSE 3135  Crosslisted With*: ___
Course Title: Strength of Materials with Laboratory
Banner course title (30 characters): Strength of Materials w/ Lab
Check All That Apply:  
Required for Major: X  Required for Minor: ___  Specified Elective: ___
Required for Concentration: ___  Elective:  ___ Service Course: ___

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

**Federal Credit Hour Definition:** A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:
(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward the award of credit hours. 34CFR 600.2 (11/1/2010)

Credit Hours: 4(3+2)

Face-to-Face or Equivalent Hours per course:
Lecture 45  Lab 30  Internship 0  Practicum 0  Other (please specify type and hours): ____

Additional Student Work Hours per course: 105
Schedule Type:  B  Grade Mode:  L

Variable topics umbrella course:  No X Yes  If Yes, number of credit hours allowed ____

Specified repeatable course: No X Yes  ___

APPROVED:  
Department Chair OR Program Director  
Date  
Dean OR Associate Dean  
Date  
Associate VP, Academic and Student Affairs  
Date

*If crosslisted, attach completed Course Crosslisting Agreement Form
Prefix and Course Number: SSE 3135

Prerequisite(s): SSE 2150 with grade “C” or better, or permission of instructor

Corequisite(s):

Prerequisite(s) or Corequisite(s):

Banner Enforced:

Prerequisite(s): SSE 2150 with grade “C” or better
Corequisite(s):

Prerequisite(s) or Corequisite(s):

Registration restrictions: Level _____ Class _____ Program/Major _____ Student attribute ____

Catalog Course Description:
Students in this course are introduced to the fundamentals in the strength and deformation of engineering materials. Students will focus on the development of constitutive relationships of materials under axial, torsion, transverse shear and bending loading conditions, and the engineering applications in the first part of the course. Students will be introduced to beam deflection and column buckling theories and engineering solutions in the second part of the course. Students will use laboratory time to enhance the knowledge and theories developed in the class and to use different equipment measuring engineering properties of various materials.

Required Reading and Other Materials will be equivalent to:

Specific, Measurable Student Behavioral Learning Objectives:
Upon completion of this course the student should be able to:

1. apply knowledge of mathematics and science to solve fundamental material strength and deformation problems
2. design and conduct experiments to measure engineering properties of materials, as well as to analyze and interpret the experiment data
3. solve class projects problems and conduct laboratory experiments in a team environment
4. identify, formulate, and solve material strength-deformation and stress-strain problems under different individual loading conditions, such as axial loading, torsion, shear and bending, as well as combined loading conditions for beams, columns, pressured vessels and other common engineering structural members
5. use failure criteria for ductile and brittle materials
6. write laboratory reports and present class project effectively
7. demonstrate knowledge of fundamental constitutive laws and recognition of the development of the theories of different of man-made materials, and be able to engage in life-long learning

Detailed Outline of Course Content:
I. Concept of Stress and Strain
   A. Normal Stress
   B. Shear Stress
   C. Normal Strain
   D. Shear Strain
II. Engineering Properties of Materials and Relationship of Stress and Strain
   A. Proportional Limit
   B. Yield Point
   C. Strain Hardening
   D. Ultimate Strength
   E. Failure Strength
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F. Elasticity and Plasticity
G. Concept of Linear and Non-linear Behavior of Materials
H. Hook’s Law
I. Elastic Modulus
J. Modulus of Toughness
K. Modulus of Resilience
L. Poison’s Ratio

III. Materials under Axial Loading Condition
IV. Materials under Torsion Condition
V. Materials under Transverse Shear Condition
VI. Materials under Pure Bending Condition
VII. Materials under Combine Loading Condition
   A. State of Stress
   B. Mohr’s Circle
   C. Stress Transfer
   D. Principal Stress
VIII. Failure Criteria of Materials
   A. Maximum Shear Stress Theory
   B. Maximum Distortion Energy Theory
   C. Maximum Normal Stress Theory
   D. Mohr’s Failure Criterion
IX. Beam Deflection
   A. Elastic Curve
   B. Beam Deflection Equation
   C. Analytic Solution of Beam Deflection
   D. Superposition Solution of Beam Deflection
X. Column Buckling and Stability Analysis
XI. Energy Method and Engineering Application
XII. Laboratory Tests
   A. Compression of A Helical Spring
   B. Poisson ratio
   C. Tension test
   D. Photo-Elastic
   E. Cantilever
   F. Deflection Equation
   G. Concrete Aggregate Properties
   H. Concrete Mix Design
   I. Concrete Mix
   J. Concrete 7 day Test
   K. Wood buckling
   L. Concrete 21 Day Test

Evaluation of Student Performance:
1. Examinations
2. Assignments
3. Projects
4. Laboratory reports