PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

STRENGTH OF MATERIALS
MET 1050

Lecture/Lab Hours: 4   **Credit Hours: 3**

                                                           Date Revised: Spring 2017

Catalog Course Description

A study of the internal reactions within a rigid body caused by external forces acting on the body. Included are moments of inertia, stress, strain, torsion, and bending and deflection of beams. The study includes commonly used metals, composites materials and plastics.

Prerequisites

MET 1040

Co-requisites

None

Textbooks and Other Supplies

Applied Statics and Strength of Materials: Limbrunner and Speigel, Pearson Prentice Hall, 5th edition or newer, 2009.

Week/Topic Basis

Week	Topic
1	Centroids and moment of inertia
2-4	Concept of stress and strain Simple stress, shear stress, bearing stress Axial strain, shear strain, Hooke's Law
5	Mechanical properties of materials
6-8	Poisson's ratio, thermal effects Stress concentrations
9-10	Torsion
11	Shear and bending moments in beams
12-13	Stresses in beams

14	Deflections in simple beams
15	Final Exam

Engineering Technology General Outcomes (Educational objectives)

I.   Apply basic engineering theories and concepts creatively to analyze and solve technical problems.
II. Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
III. Communicate effectively using developed writing, speaking, and graphics skills.
IV. Assimilate and practice the concepts and principles of working in a team environment.
V.   Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology.

Engineering Technology Concentration Competencies
NOTE: At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

Students will
A. Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities.
B. Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge.
C. Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results.
D. Function effectively as a member of a technical team.
E. Identify, analyze and solve specifically defined engineering technology-based problems.
F. Employ written, oral and visual communication in a technical environment.

Course Goals
NOTE: Capital letters after course goals reference competencies of the Engineering Technology concentration listed above

The course will
1. Guide students to determine moments of inertia using calculus concepts. (A,B,E,F)
2. Guide students to evaluate the stress and strains in structures and machines. (A,B,E,F)
3. Expand students understanding of the relationships between stress and strain, and use these relationships to evaluate the mechanical properties of common engineering materials. (A,B,C,E,F)

4.   Expand students' ability to determine the stress distribution and angle of twist in hollow or solid circular shafts. (A,B,C,E,F)
5.   Guide students to evaluate shear forces, bending moments, and deflection along the length of statically determinate beams. (A, B, C, E, F)
6.   Enhance students' ability to effectively operate equipment used in the field of strength of materials and effectively communicate the results of experiments. (A,B,C,E,F)

Expected Student Learning Outcomes

NOTE: Numbers after Expected Student Learning Outcomes reference the course goals listed above.

The student will

a.   Calculate moment of inertia for a specific cross section using calculus concepts. (1)
b.   Analyze various systems and solve for normal axial stress. (1)
c.   Analyze various systems and solve for shear stress. (1)
d.   Analyze various systems and solve for stresses due to abrupt changes in geometrical shape. (1)
e.   Analyze various systems and solve for axial strain. (1)
f.   Use stress-strain diagrams to evaluate material properties. (1, 2)
g.   Solve for thermal strain. (1)
h.   Associate and apply the concepts of Hooke's Law, and Poisson's Ratio. (1, 2)
i.   Calculate torsion stress and angle of twist for structures subjected to twisting loads. (3)
j.   Draw shear and bending moment diagrams for various types of beams. (4)
k.   Calculate bending stresses or moments at various sections of a beam. (4)
l.   Calculate the deflection of beams under varied loads. (4)
m.   Complete experiments on strength of materials and prepare college level written reports. (5)
n.   Work with team members to construct a truss, experimentally determine the maximum load the truss can hold, complete a laboratory report and give a presentation to the class on the results. (5,6).

Evaluation

Evaluation of both classroom and laboratory work is required in this course. Total evaluation will be based on the following point distribution.

Testing Procedures

Unit Exams   **50 points**
There will be 4-6 unit exams administered during the course.

Homework/Presentation   **10 Points**
Homework will be assigned throughout the semester. Late homework will not be accepted

Final Exam   **15 Points**
There will be a comprehensive final exam administered at the end of the course.

Laboratory Experiences

Laboratory   **25 points**
Laboratory will include special projects and one oral presentation., The instructor will provide quidelines and requirements for special projects.

Field Work

N/A

Other Evaluation Methods

N/A

Grading Scale

Final grade for this course will be based on the following alphabetical/numerical scale.

A	93-100
B+	88-92
B	83-87
C+	79-82
C	74-78
D	65-73
F	Below 65

Policies

Attendance Policy

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

Academic Dishonesty

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

Accommodations for Disabilities

Students that need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Disability Services (DS) in order to receive accommodations in this course. Disability Services (http://www.pstcc.edu/sswd/) may be contacted via Disability Services email or by visiting Alexander 130.

Other Policies

Safety and Equipment Abuse

Repeated safety violations will result in a reduction of final grade, at the instructor's discretion. Flagrant violations which result in equipment damage or personal injury could result in automatic failure of the course