PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

ENGINEERING MECHANICS
ENS 2021

Class Hours: 2.0       Credit Hours: 2.0
Laboratory Hours: 0.0   Revised: Fall 06

Catalog Course Description:

Review of vector algebra. Statics of two-dimensional trusses and frames, including methods of joints and sections. Geometric properties of cross sections, including first and second moments and location of centroid. Inertial properties of rigid bodies, including moment of inertia and location of mass center.

Entry Level Standards:

Students entering this course must have a comprehensive knowledge of mathematics, including knowledge of algebra, trigonometry, and geometry, and basic engineering physics concepts including vectors and Newton’s Laws. They must have demonstrated a capacity for solving problems.

Prerequisites:

ENS 1510

Corequisites:

ENS 1520

Textbook(s) and Other Course Materials:


I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vectors</td>
</tr>
<tr>
<td>2</td>
<td>Force Vectors</td>
</tr>
<tr>
<td>3</td>
<td>Moments of a Force</td>
</tr>
<tr>
<td>4</td>
<td>Particle Equilibrium</td>
</tr>
<tr>
<td>5</td>
<td>Particle Equilibrium</td>
</tr>
<tr>
<td>6</td>
<td>Rigid Body Equilibrium</td>
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<tr>
<td>7</td>
<td>Rigid Body Equilibrium</td>
</tr>
</tbody>
</table>
II. Course Objectives*:

A. Use mathematical principles to perform scalar and vector operations for two and three-
   dimensional forces. I.6, VI.1, VI.2, VI.3, VI.4, VI.5, VII.3, VII.4, VII.5, VII.6.

B. Use mathematical principles to calculate the moment of a force about a point, primary axis
   and specified line. I.6, VI.1, VI.2, VI.3, VI.4, VI.5, VII.3, VII.4, VII.5, VII.6.

C. Use mathematical principles to analyze and solve problems dealing with two and three-
   dimensional particle equilibrium. I.6, VI.1, VI.2, VI.3, VI.4, VI.5, VII.3, VII.4, VII.5, VII.6.

D. Use mathematical principles to analyze and solve problems dealing with two and three-
   dimensional rigid body equilibrium. I.6, VI.1, VI.2, VI.3, VI.4, VI.5, VII.3, VII.4, VII.5, VII.6.

E. Use mathematical principles to analyze and solve problems dealing with two dimensional
   analysis of trusses and frames. I.6, VI.1, VI.2, VI.3, VI.4, VI.5, VII.3, VII.4, VII.5, VII.6.

F. Use mathematical principles to determine center of gravity and moment of inertia for a body
   of mass. I.6, VI.1, VI.2, VI.3, VI.4, VI.5, VII.3, VII.4, VII.5, VII.6.

*Roman numerals after course objectives reference goals of the (career/technical program or university
parallel) program.

III. Instructional Processes*:

Students will:

1. Actively listen to class lectures and participate in class discussions that develop and
   reinforce an understanding of the theories, concepts, principles, and applications of
   engineering mechanics. Communication Outcome, Mathematics Outcome, Technological
   Literacy Outcome, Active Learning Strategies

2. Use critical thinking to solve problems presented in the book, class projects, and class
   exams. Communication Outcome, Mathematics Outcome, Technological Literacy Outcome,
   Active Learning Strategies

3. Use technology available to expand upon or solve problems in the text; examples may
   include software packages such as MATLab, Working Model, and MD Solids. Mathematics
   Outcome, Technological Literacy Outcome
Strategies and outcomes listed after instructional processes reference TBR's goals for strengthening general education knowledge and skills, connecting course work to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Perform vector operations. A
2. Split forces into Cartesian vector format. A
3. Add and subtract forces using vector analysis. A
4. Calculate the moment of a force about a point, an axis, and a line using both scalar and vector analysis. B
5. Calculate the moment of a couple. B
7. Calculate forces in coplanar two and three dimensional force systems. C
8. Calculate forces at supports in two and three dimensional rigid body systems. D
9. Determine the internal forces in each member of a two dimensional truss using the method of joints analysis. E
10. Determine the internal forces in each member of a two dimensional truss using the method of sections analysis. E
11. Calculate the forces at each support and connection in a two dimensional frame. E
12. Determine the center of gravity, centroid and center of mass for a body. F
13. Calculate the moment of inertia for an area using the basic definitions and parallel axis theorem. F
14. Calculate the moment of inertia for an area using the radius of gyration. F
15. Calculate the moment of inertia for an area using integration. F

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 100%
   - Six module exams (45%)
   - Homework (15%)
   - Comprehensive Final Exam (30%)
   - Quizzes (10%)

B. Laboratory Expectations:

N/A
C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>92 - 100</td>
</tr>
<tr>
<td>B+</td>
<td>87 - 92</td>
</tr>
<tr>
<td>B</td>
<td>82 - 86</td>
</tr>
<tr>
<td>C+</td>
<td>77 - 81</td>
</tr>
<tr>
<td>C</td>
<td>70 - 76</td>
</tr>
<tr>
<td>D</td>
<td>60 - 69</td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
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VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course (Pellissippi State Catalog). Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements are more stringent.

B. 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. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.

C. Accommodations for disabilities:

If you need accommodations because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Please see the instructor privately after class or in his/her office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127 or 131 or by phone: 694-6751(Voice/TTY) or 539-7153.