PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS  

PHYSICS FOR ENGINEERS II  
ENS 1520

Class Hours: 3.0  
Credit Hours: 4.0

Laboratory Hours: 3.0  
Revised: Fall 06

Catalog Course Description:

Calculus based study of basic physics concepts including rotational dynamics, statics, oscillations, waves, fluids, heat and temperature, and first and second law of thermodynamics. Introduction to team work. Introduction to the engineering disciplines, examination of engineering principles and design issues.

Entry Level Standards:

Students entering this course must have a comprehensive knowledge of mathematics, including knowledge of differential and integral calculus, and computer applications used in engineering problem solving and communication. They must have demonstrated a capacity for solving problems.

Prerequisites:

ENS 1510, MATH 1910

Textbook(s) and Other Course Materials:


I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Rotations of Rigid Bodies</td>
</tr>
<tr>
<td>2</td>
<td>Angular Momentum and Torque</td>
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<tr>
<td>3</td>
<td>Statics</td>
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<tr>
<td>4</td>
<td>Statics</td>
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<tr>
<td>5</td>
<td>Gravitation</td>
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<tr>
<td>6</td>
<td>Oscillatory Motion</td>
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<tr>
<td>7</td>
<td>Waves</td>
</tr>
<tr>
<td>8</td>
<td>Properties of Fluids</td>
</tr>
<tr>
<td>9</td>
<td>Properties of Fluids</td>
</tr>
</tbody>
</table>
II. Course Objectives*:

A. Use mathematical principles to analyze and solve problems dealing with rigid bodies in general plane motion. I.5, I.6, V.1, V.2, V.3, VI.1, VI.2, VI.3, V.4, VI.5, VI.6, VII.1, VII.2, VII.3, VII.4, VII.5, VII.6.

B. Use mathematical principles to analyze and solve problems dealing with the statics of rigid bodies and gravitation of planetary motion. I.5, I.6, V.1, V.2, V.3, VI.1, VI.2, VI.3, V.4, VI.5, VI.6, VII.1, VII.2, VII.3, VII.4, VII.5, VII.6.

C. Use mathematical principles to analyze and solve problems dealing with oscillatory motion and waves. I.5, I.6, V.1, V.2, V.3, VI.1, VI.2, VI.3, V.4, VI.5, VI.6, VII.1, VII.2, VII.3, VII.4, VII.5, VII.6.

D. Use mathematical principles to analyze and solve problems dealing with fluids and ideal gases. I.5, I.6, V.1, V.2, V.3, VI.1, VI.2, VI.3, V.4, VI.5, VI.6, VII.1, VII.2, VII.3, VII.4, VII.5, VII.6.

E. Use mathematical principles to analyze and solve problems dealing with the first and second law of thermodynamics. I.5, I.6, V.1, V.2, V.3, VI.1, VI.2, VI.3, V.4, VI.5, VI.6, VII.1, VII.2, VII.3, VII.4, VII.5, VII.6.

F. Follow written laboratory procedures, work with peers to complete lab assignments, write reports understandable to others, and give oral presentation on results and conclusions. I.1, I.4, I.5, I.6, V.1, V.2, V.3, V.4, VI.1, VI.6, VII.1.

*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 related equipment and tools for making engineering related measurements and observations. Natural Sciences Outcome, Technological Literacy Outcome
4. Collect data, generate graphs and tables of the collected data, summarize the data, and draw conclusions from the data. *Natural Sciences Outcome, Technological Literacy Outcome.*

5. Create written reports and oral presentations based on laboratory experiences. *Communication Outcome, Technological Literacy Outcome.*

6. 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. Apply mathematical techniques, including calculus, to determine linear as well as angular displacement, velocity, and acceleration of rigid bodies in pure rotation as well as general plane motion. A, F

2. Apply equations of static equilibrium to determine forces acting on objects at rest. B, F

3. Analyze forces acting on objects in planetary motion to determine the gravitational force, trajectory, velocity, acceleration or radius of curvature. B

4. Relate springs, pendulum, uniform circular motion with simple harmonic motion. C, F

5. Evaluate various parameters of wave motion for both standing and traveling waves. C, F

6. Understand the various properties of incompressible fluids and how pressure and velocity are affected by changes in the elevation and flow area. D, F

7. Understand basic concepts of thermal science and how they relate to the first and second laws of thermodynamics. D, E, F

8. Apply dimensional analysis to insure correctness of solution concerning units. A, B, C, D, E, F

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

**V. Evaluation:**

A. Testing Procedures: 80% of grade

- Six module exams (48%)
- Homework (10%)
- Comprehensive Final Exam (17%)

B. Laboratory Expectations: 20% of grade

- Group experiments/projects will be completed and results will be documented in a laboratory report. All lab material will be kept in a portfolio which will also be part of the laboratory grade
C. Field Work:

N/A

D. Other Evaluation Methods: 5%

Participation in laboratory and classroom lectures

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>
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<tr>
<td>B+</td>
<td>87 - 92</td>
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<tr>
<td>B</td>
<td>82 - 86</td>
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<tr>
<td>C+</td>
<td>77 - 81</td>
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<tr>
<td>C</td>
<td>70 - 76</td>
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<tr>
<td>D</td>
<td>60 - 69</td>
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<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) a failing mark (F) or zero for the assignment or (2) a failing grade (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.