PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

THERMODYNAMICS AND HEAT TRANSFER
MET 2040

Class Hours: 2.0  Credit Hours: 3.0
Laboratory Hours: 3.0  Revised: Spring 05

Catalog Course Description:
A study of the basic laws of thermodynamics and heat transfer and their application to practical problems. Topics include the first and second laws of thermodynamics, properties of steam, and power cycles.

Entry Level Standards:
Students entering this course must have a basic understanding of fluid mechanics and a thorough knowledge of how to apply mathematical principles to problem-solving.

Prerequisites:
MATH 1730 & MET 2020

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>1-2</td>
<td>Review of Fluids &amp; Fundamental Concepts</td>
</tr>
<tr>
<td>3-7</td>
<td>Heat Transfer</td>
</tr>
<tr>
<td>8-10</td>
<td>First Law of Thermodynamics</td>
</tr>
<tr>
<td>11-12</td>
<td>Second Law of Thermodynamics</td>
</tr>
<tr>
<td>13-14</td>
<td>Properties of Steam &amp; Power Cycles</td>
</tr>
<tr>
<td>15</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

II. Course Objectives*:
A. Demonstrate their understanding of basis thermodynamic concepts. (A, C, D, G)
B. Demonstrate their understanding of basic heat transfer concepts. (A, C, D, G)
C. Demonstrate their understanding of the first and second laws of thermodynamics. (A, C, D, G)
D. Demonstrate their understanding of steam power generation and power cycles. (A, C, D, G)

*Letters after course objectives reference MET Program Outcomes (as required by ABET).

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 thermodynamics. Communication Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

2. Use concepts derived in the text and critical thinking skills to solve problems presented in the book, on class exams, and in the laboratory. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

3. Work individually or in teams to complete projects, lab experiments, and assignments related to the theories, concepts, principles, and applications covered in the lecture or demonstration portion of the course. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

4. Collect, analyze, and tabulate data in an orderly format to prepare a college level technical report using computer software packages such as Microsoft Word, Word Perfect, and Excel. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

5. Use research and oral presentation skills to present findings to a subject matter expert, peer group or an evaluation team from industry. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

*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. Solve problems using both the English and SI system.  A

2. Differentiate potential and kinetic energy.  A

3. Differentiate liquids and vapors.  A

4. Explain and apply the concept of specific heat.  A

5. Associate and apply the concepts of conduction, convection, and radiation heat transfer.  B

6. Identify various types of heat exchangers, explain their function, and solve for sizing based on specific applications.  B

7. Identify and analyze an isometric process, an adiabatic process, an isobaric process, an isothermal process, and a throttling process.  C

8. Analyze and solve problems dealing with heat flow in pipes, turbines, boilers, nozzles, and heat exchangers.  C

9. Identify and explain the details of the following power cycles:  D
A. Carnot Cycle
B. Rankine Cycle
C. Reheat Cycle
D. Regenerative Cycle
E. Otto Cycle

10. Apply the principles of various power cycles to common mechanical systems.  D

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

V. Evaluation:

A. Testing Procedures:

Total evaluation will be based on the following point distribution.

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Exams</td>
<td>60</td>
</tr>
<tr>
<td>Comprehensive Final Exam</td>
<td>10</td>
</tr>
</tbody>
</table>

There will be 5-6 unit exams administered during the course.

B. Laboratory Expectations:

Lab (25 Points)

Laboratory will include problem-solving sessions and a special project. Guidelines and requirements for special project will be provided by the instructor.

C. Field Work:

N/A

D. Other Evaluation Methods:

Participation (5 Points)

Based on instructor observation during the course, each student will be evaluated on participation activities. Evaluation parameters to include active participation in class discussions, response to verbal questions, and regular attendance.

E. Grading Scale:

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>92-100</td>
</tr>
<tr>
<td>B+</td>
<td>88-91</td>
</tr>
<tr>
<td>B</td>
<td>83-87</td>
</tr>
<tr>
<td>C+</td>
<td>79-82</td>
</tr>
<tr>
<td>C</td>
<td>74-78</td>
</tr>
<tr>
<td>D</td>
<td>65-73</td>
</tr>
<tr>
<td>F</td>
<td>Below 65</td>
</tr>
</tbody>
</table>

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 instructors may have requirements that are more stringent.
B. Academic Dishonesty:


C. Accommodations for disabilities:

If you need accommodation 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. Privately after class or in the instructor's office.
To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.

D. Other Policies:

Make-Up Exams: As a general rule, no make-up exams will be administered during the course.

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 will result in automatic failure of the course.

Counseling: Counseling is available during posted office hours or by appointment.