

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS

**THERMODYNAMICS & HEAT TRANSFER**  
**MET 2040**

**Class Hours: 2.0**

**Credit Hours: 3.0**

**Laboratory Hours: 3.0**

**Date Revised: Spring  
01**

**Catalog Course Description:**

A study of the basic laws of thermodynamics and heat transfer and their application to practical problems.

**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.

**Prerequisite:**

MET 2020

**Textbook(s) and Other Reference Materials Basic to the Course:**

Textbook:

*Thermodynamics and Heat Power*: Rolle, Merrill Publishing Company, 3rd Edition, 1989.

Reference:

*Thermodynamics and Heat Power*: Granet, Prentice-Hall, 4th Edition, 1990.

**I. Week/Unit/Topic Basis:**

<b>Week</b>	<b>Topic</b>
1-2	Review of Fluids & Fundamental Concepts
3-7	Heat Transfer
8-10	First Law of Thermodynamics
11-12	Second Law of Thermodynamics
13-15	Properties of Steam & Power Cycles
16	Final Exam

**II. Course Objectives\*:**

- A. Demonstrate an understanding of basic thermodynamic concepts. I, II, IV
- B. Demonstrate an understanding of basic heat transfer concepts. I, II, IV

C. Demonstrate an understanding of the first and second laws of thermodynamics. I, II, IV

D. Demonstrate an understanding of steam power generation and power cycles. I, II, IV

\*Roman numerals after course objectives reference goals of the MET program.

### III. Instructional Processes\*:

Students will:

1. Actively listen to class lectures and participate in class activities that develop and reinforce an understanding of the theories, concepts, principles, and applications of thermodynamics. *Communication Outcome, Problem Solving & Decision Making Outcome, Information Literacy Outcome, Active Learning Strategy*
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. *Problem solving and Decision Making Outcome, Numerical Literacy Outcome*
3. Work individually and in teams to complete lab projects and assignments related to the theories, concepts, and principles covered in the lecture or demonstration section of the course. *Communication Outcome, Personal Development Outcome, Problem Solving & Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*
4. Collect, analyze, and tabulate data in an orderly format to prepare a college level technical report using computer software packages including Microsoft Word, Word Perfect, and Microsoft Excel. *Communication Outcome, Problem Solving & Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy, Transitional Strategy*
5. Use research, computer, and oral presentation skills to research a topic and present findings to a subject matter expert, a peer group or an evaluation team from industry. *Communication Outcome, Personal Development Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*

\*Strategies and outcomes listed after instructional processes reference Pellissippi State's goals for strengthening general education knowledge and skills, connecting coursework 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: 80 points

There will be 5-6 unit exams administered during the course. (70 points)  
Comprehensive final exam (10 points)

### B. Laboratory Expectations: 15 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. 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:

A 92-100  
B+ 88-91  
B 83-87  
C+ 79-82  
C 74-78  
D 65-73  
F Below 65

## **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.

B. Academic Dishonesty:

Cheating on a quiz or assigned project will not be tolerated. First offense will result in immediate dismissal and automatic failure of the course. Assistance from other students is encouraged during the learning stages of the course, but each student is responsible for completing their own course assignments.

C. Other Policies:

Make-Up Exams: As a general rule, no make-up quizzes or 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.