

## **COURSE INFORMATION**

Course Prefix/No: **MET 222**  
Course Title: **Thermodynamics**  
Lecture Hrs/Wk: **3.0**  
Lab Hrs/Wk: **3.0**  
Credit Hrs/Semester: **4.0**

[Distance Learning Attendance/VA Statement](#)  
[Textbook Information](#)

## **COURSE DESCRIPTION:**

This course includes the study of the thermodynamic principles of heat, work, non-flow and steady flow processes and cycles. The use of thermodynamic tables and charts is stressed.

## **COURSE COMPETENCIES:**

Upon completion of the course the student will be competent to perform the following tasks:

### **Module 1**

- Explain the concepts of Zeroth law as it applies to defining temperature and heat
- Use pressure and temperature measuring devices appropriate for the situation
- Use critical thinking strategies to solving problems

### **Module 2**

- Define concepts of work, energy, and heat, and their transition from one form to another.
- Solve problems related to heat engines, thermal efficiencies, and thermal processes
- Apply concepts of the first law of thermodynamics to various processes in heat engines
- Use critical thinking strategies to solving problems

### **Module 3**

- Explain and describe the underlying theories behind the Carnot cycle, Rankin cycle, and refrigeration cycle
- Apply concepts of the second law of thermodynamics in solving heat engine problems
- Apply concepts of reversible and irreversible processes to thermodynamic systems
- Use saturated and superheated steam tables in solving boiler and steam turbine problems
- Size heat exchangers (both parallel and counter flow)
- Perform heat balances of thermodynamic systems

### **Module 4**

- Apply the general energy equation to solving heat engine problems
- Apply the ideal gas laws in solving heat engine problems

- Calculate systems efficiency for gasoline, diesel, and Rankin cycles based on theories of ideal gas laws
- Explain and describe the concepts of fuel cells and hybrid engines

### **MINIMAL STANDARDS:**

Students must complete all modules and achieve a 60% average on all exams, lab reports, projects, or any other required assignments. Assignments and attendance must be completed as designated in "Evaluation Strategies/Grading."

### **COURSE REQUIREMENTS:**

There will be a minimum of four tests and a weekly lab grade. Students are expected to take notes in class, read assignments, and do homework. Homework will be collected on a regular basis during each class meeting. Students are expected to keep a "loose-leaf" homework notebook for this purpose.

### **ATTENDANCE:**

During the semester students may miss a total of nine classes, which is about 20% of all class meetings. However, absences beyond 20% will result in withdrawal from the course. A grade of "W" will be assigned prior to midterm and a grade of "WF" may be assigned after midterm. Students must attend at least 80% of the hours assigned to the class for the semester to receive credit for the course.

#### **Missing Class**

In case a student does miss a class, he/she is responsible for obtaining the material that was covered during the absence. If a student is aware that he/she will miss a class, then the student should notify the instructor at the earliest possible date.

#### **Missing Lab**

In case a student does miss a lab, he/she is responsible for completing the lab as soon as possible (preferably before the test covering the lab material). The lab will have to be made up on the student's own time.

#### **Missing a Test**

If a student misses a test because of illness or an emergency, he/she should notify the instructor prior to the class period or at the earliest possible date. At that time a new date for the makeup test will be scheduled. Students with unexcused absences during a test will be allowed to take a makeup test at the discretion of the instructor. The student has the burden to be sure that some arrangement is made with the instructor for taking a makeup test. A missed test will result in a grade of "zero" if student fails to make an effort to make up the test.

### **STUDENT CONDUCT:**

York Technical College adheres to the South Carolina TECH Student Code and Grievance Procedure, approved by the State Board for Technical and Comprehensive Education on November 13, 2003. (Copies of this *Student Code and Grievance Procedure* are available in the College Library, the Industrial & Engineering Technologies Division Offices in Building C and D, the Business, Computer, Arts & Sciences Division Office in Building A, the Health & Human Services Division Office in Building A, the Student Government Association

Office in the Student Center, in the Student Services Building., and on the College's website.) It is the policy of York Technical College that the *Student Code and Grievance Procedure* shall govern conduct and guarantee due process for students enrolled at the College. The College expects all students to conduct themselves with dignity and to maintain high standards of responsible citizenship.

### **PARTICIPATION IN CLASS:**

Students will be expected to participate in class discussions, to demonstrate problem-solving techniques, and to complete tests, homework, lab experiments, lab reports, and other assigned work.

### **LAB REQUIREMENTS:**

During laboratory experiments, the students may work in teams of two or individually if space permits. Students must demonstrate to the instructor that all equipment are properly functioning and gathering data. All assigned lab work must be completed before the student leaves the lab unless prior arrangements are made with the lab instructor.

### **ACADEMIC HONESTY:**

The policy found in the current College Student Handbook will be enforced in this class. York Technical College adheres to the South Carolina TECH Student Code, approved by the State Board for Technical and Comprehensive Education on March 13, 1974 (revised last April 25, 1984). Copies of this code are available in the Library and from Student Services. Any student caught cheating or involved in any other academic dishonesty will be given a grade of zero and will be subject to further disciplinary action.

**NO BEEPERS OR CELL PHONES WILL BE ALLOWED IN THE CLASSROOM.**

### **METHODS OF INSTRUCTION:**

Traditional lectures and problem-solving sessions will be used to accomplish course competencies. Other media such as the internet, CD-ROMs, DVDs, or videos may be used if the instructor deems appropriate for certain topics.

### **EVALUATION STRATEGIES/GRADING:**

Each module will comprise 25% of the final grade. No final exam will be given; students may request a retest for grades below 70%. Maximum retest score will be 80%. The grading scale follows:

<b>GRADE</b>	<b>POINTS</b>
A	90 - 100
B	80 - 89
C	70 - 79
D	60 - 69
F	0 - 59

<b>Evaluation Method</b>	<b>Total Points</b>
Tests (four minimum, 1 per module)	60%
Lab reports	20%
Homework	10%
Work Ethics	10%
Distributed evenly among:	
Attendance	
Team work	
Safety	
Participation	
Ethical behavior	
Respect for others	
Timeliness	
Quality	
Perseverance	
Cooperation	

### **ENTRY LEVEL SKILLS**

Completion of CHM 101 is desirable but not necessary

### **PREREQUISITE**

MAT 110 or equivalent

### **CO-REQUISITE**

MET 114