

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS

**MATERIALS AND MANUFACTURING PROCESSES**  
**MET 1010**

**Class Hours: 2.0**

**Credit Hours: 3.0**

**Laboratory Hours: 3.0**

**Date Revised: Spring  
00**

**Catalog Course Description:**

An overview of material science and a survey of traditional and high-tech manufacturing processes.

**Entry Level Standards:**

Students entering this course must have completed basic skills in reading comprehension, written communication, and mathematics.

**Prerequisite:**

MET 1001 for MET majors; no prerequisite for non-majors

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

Textbook:

*Modern Materials and Manufacturing Processes:* Gregg Bruce, Mileta Tomovic, John Neely and Richard Kibbe, Prentice Hall, Second Edition, 1998.

References:

*Engineering Materials, Properties and Selection:* Budinski, Reston Publishing Company, 2nd Edition, 1983.

*Manufacturing Processes:* Amstead, Ostwals, and Begeman, Reston Publishing Company, 8th Edition, 1987.

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

<b>Week</b>	<b>Topic</b>
1	Introduction; Atomic and Crystalline Structure of Materials
2	Metallurgical Science
3	Heat Treatment of Metals
4-5	Extraction & Refinement of Common Metals and non metals
6	Selection and Application of Materials
7	Foundry Processes
8	Hot Working Operations
9	Cold Working Operations

- 10 Powder Metallurgy
- 11 Plastics and Composites Processing
- 12 Corrosion
- 13 Production Line Automation
- 14 Industrial Safety
- 15 Right to Know & 2-3 OSHAc
- 16 Final Exam Period

## II. Course Objectives\*:

- A. Understand the atomic and crystalline structure of metals and the use of metallurgical diagrams as related to heat treatment.  
I, III
- B. Understand the extraction and refinement processes of both metallic and nonmetallic materials. I, IV
- C. Understand the basic processes used in forming metals. I, II, IV
- D. Understand the basic processes used in powder metallurgy and in the forming of plastics and composite materials. I, IV
- E. Understand basic Industrial Safety Concepts, Right to Know Legislation, and the OSHA Act and Administration. I, II, IV, V

\*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 discussions that develop and reinforce an understanding of the theories, concepts, principles, and applications of material science and manufacturing processes. *Communication Outcome, Problem Solving and Decision Making Outcome, Information Literacy Outcome, Active Learning Strategies*
2. Work individually and in teams to complete lab experiments, and assignments related to the theories, concepts, principles, and applications covered in the lecture or demonstration portion of the course. *Communication Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategies*
3. 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, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategies*
4. Use research and oral presentation skills to present findings to a subject matter expert, and peer group. *Communication Outcome, Problem Solving and Decision Making Outcome, Information Literacy Outcome, Active Learning Strategies*

5. View instructional video tapes on topics related to course subject matter, complete workbook assignments and apply concepts by replicating circuits on test stand to increase problem solving skills along with identification and recognition of components. *Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Active Learning Strategies*
6. Participate in field trips to local industries to increase student knowledge of modern manufacturing processes and to enhance awareness of required job skills and opportunities in industry. *Transitional Strategy, Active Learning Strategies*

\*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. Describe and analyze the crystalline structure of metals. A
2. Describe the ramifications of the iron carbon diagram and isothermal transformation diagrams as related to heat treated steels. A
3. Explain and perform basic heat treating operations on carbon steels. A
4. Describe basic mining and extraction techniques and list the ores from which the various metals are extracted. B
5. Identify and explain basic steel making equipment and processes. B
6. Identify and describe alloying techniques for various metals. B
7. Identify and explain basic casting processes used in industry. C
8. Identify and explain basic hot metal working processes used in industry. C
9. Identify and explain the basic cold metal working processes used in industry. C
10. Identify and explain common mass production techniques used in industry. D
11. Identify and explain basic plastic forming processes used in industry. D
12. Explain basic processes, operations, and concepts used in making powder metallurgy parts. D
13. Identify and discuss concepts related to industrial and occupational safety. E
14. Discuss the rationale and operation of the Right To Know and OSHA Acts. E

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

#### **V. Evaluation:**

A. Testing Procedures:

Unit Exams--50 points  
Comprehensive Final Exam--20 points

There will be 5-8 unit exams administered during the course. They will include discussion questions, short answer questions, true/false questions, and problem solving. As a general rule, no make-up exams will be administered during the course.

**B. Laboratory Expectations:**

Project 1: Metal Sample Analysis--15 points

Project 2: Research & Presentation--10 points

Guidelines and requirements for each project will be provided by the instructor.

**C. Field Work:**

Industrial visitations are required as part of the course assignments and will be announced in advance.

**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, being prepared, efficient use of lab time, striving to achieve more than minimum requirements, 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:**

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.

