

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

**MATERIALS AND MANUFACTURING PROCESSES
MET 1012**

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

Revised: Fall 06

Catalog Course Description:

An overview of material science and a survey of traditional, as well as, high-tech manufacturing processes with a strong emphasis on OSHA and safety.

Entry Level Standards:

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

Corequisites:

ENGT 1000 for MET majors; no corequisite for non-majors

Textbook(s) and Other Course Materials:

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

References: *Engineering Materials, Properties and Selection*: Budinski, Reston Publishing Company, Latest Edition.

Manufacturing Processes: Amstead, Ostwals, and Begeman, Reston Publishing Company, Latest Edition.

I. Week/Unit/Topic Basis:

Week	Topic
1	Introduction Atomic And Crystalline Structure Of Materials
2	Metallurgical Science
3	Heat Treatment Of Metals
4-5	Extraction & Refinement Of Common Metals
6	Selection And Application Of Materials
7	Foundry Processes

8	Hot Working And Cold Working Operations
9	Powder Metallurgy
10	Plastics And Composites Processing
11	Corrosion
12	Production Line Automation
13	Industrial Safety
14	Right To Know And OSHA Act
15	Final Examination

II. MET Program Objectives & Outcomes:

Objectives:

- I. Apply basic engineering theories and concepts.
- II. Apply basic engineering theories and concepts.
- III. Identify and solve work related problems with minimum assistance.
- IV. Operate equipment and instruments with a high degree of skill.
- V. Communicate effectively, including verbal, writing, and graphical skills.
- VI. Apply the principles of good work ethics.
- VII. Obtain gainful employment in the MET discipline or matriculate to a 4-year program in engineering technology.

Outcomes:

- A. apply the knowledge of mathematics, science, and engineering technology. (I, II, IV, VI)
- B. use the techniques and modern engineering tools needed for engineering technology practices. (I – IV, VI)
- C. identify, formulate, and solve engineering technology-based problems. (I, II, VI)
- D. design and conduct experiments, as well as analyze and interpret collected data. (I– IV, VI)
- E. create or fabricate a system, subsystem, component, or process to meet specified needs. (I – IV, VI)
- F. read and extract information from manuals, journals, and other discipline related literature. (I –IV, VI)
- G. communicate effectively, including verbal, writing, and graphical skills. (IV, V, VI)
- H. function and contribute positively in team situations. (II, IV- VI)

- I. comprehend social, professional, and ethical responsibilities, including development of a respect for diversity and other contemporary issues.(II, V, VI)
- J. realize the impact of engineering technology solutions in a global and societal context. (V, VI)
- K. realize the importance of a commitment to quality, timeliness, and continuous improvement. (V, VI)
- L. recognize the importance of life-long learning.(I – VI)

III. Course Objectives*:

- A. Demonstrate their understanding of the atomic and crystalline structure of metals and the use of metallurgical diagrams as related to heat treatment. (A, B, D)
- B. Demonstrate their understanding of the extraction and refinement processes of both metallic and nonmetallic materials. (A, B, G, H)
- C. Demonstrate their understanding of the basic processes used in forming metals. (A, D, F, G, H)
- D. Demonstrate their understanding of the basic processes used in powder metallurgy and in the forming of plastics and composite materials. (A, D, F, G, H)
- E. Demonstrate their understanding of basic Industrial Safety Concepts, Right to Know Legislation, and the OSHA Act and Administration. (A, D, F, G, J)

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

IV. 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, Mathematics Outcome, Technological 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, Natural Sciences Outcome, Mathematics Outcome, Technological 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, Natural Sciences Outcome, Mathematics Outcome, Technological 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, Natural Sciences Outcome, Mathematics Outcome, Technological 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. *Communication Outcome, Mathematics Outcome, Technological 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. *Communication Outcome, Mathematics Outcome, Technological Literacy Outcome, Transitional Strategies, 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.

V. 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.

VI. Evaluation:

- A. Testing Procedures:

Evaluation of both classroom and laboratory work is required in this course. Total evaluation will be based on the following point distribution.

Unit Exams (50 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.

Comprehensive Final Exam (10 Points)

B. Laboratory Expectations:

Project 1: Metal Sample Analysis (15 Points)

Project 2: Research & Presentation (20 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:

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

A 93-100

B+ 88-92

B 83-87

C+ 79-82

C 74-78

D 65-73

F Below 65

VII. 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).

B. Academic Dishonesty:

Refer to the Mississippi State Catalog & Handbook.

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.

D. Other Policies:

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

Your instructor is available during posted office hours or by appointment.