PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

MATERIALS & MANUFACTURING PROCESSES
MET 1012

Lecture/Lab Hours: 4 **Credit Hours: 4**

Date Revised: Spring 2017

Catalog Course Description

An overview of material science regarding a spectrum of metals and plastics, along with a survey of traditional as well as technically advanced manufacturing processes, with a strong emphasis on environmental responsibility, OSHA regulations and accepted safety practices.

Prerequisites

None

Co-requisites

ENGT 1010

Textbooks and Other Supplies

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

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 and Refinement of Common Materials
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 Exam

Engineering Technology General Outcomes (Educational objectives)

I. Apply basic engineering theories and concepts creatively to analyze and solve technical problems.
II. Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
III. Communicate effectively using developed writing, speaking, and graphics skills.
IV. Assimilate and practice the concepts and principles of working in a team environment.
V. Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology.

Engineering Technology Concentration Competencies

NOTE: At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

Students will

A. Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities.
B. Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge.
C. Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results.
D. Function effectively as a member of a technical team.
E. Identify, analyze and solve specifically defined engineering technology-based problems.
F. Employ written, oral and visual communication in a technical environment.

Course Goals

NOTE: Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

The course will

1. Expand student understanding of the atomic and crystalline structure of metals and the use of metallurgical diagrams as related to heat treatment. (A,B,C,E,F)
2. Guide students to demonstrate their understanding of the extraction and refinement processes of both metallic and nonmetallic materials. (A,B,C,E,F)
3. Enhance effective understanding of the basic processes used in forming metals. (A,B,C,E,F)
4. Guide students to demonstrate their understanding of the basic processes used in powder metallurgy and in the forming of plastics and composite materials. (A,B,C,E,F)
5. Guide students to an understanding of basic Industrial Safety Concepts, Right to Know Legislation and the OSHA Act and Administration. (A,B,C,E,F)

Expected Student Learning Outcomes

NOTE: Numbers after Expected Student Learning Outcomes reference the course goals listed above.

The student will

a. Describe and analyze the crystalline structure of metals. (1)
b. Describe the ramifications of the iron carbon diagram and isothermal transformation diagrams as related to heat treated steel. (1)
c. Explain and perform basic heat treating operations on carbon steels. (1)
d. Describe basic mining and extraction techniques and list the ores from which the various metals are extracted. (2)
e. Identify and explain the basic steel making equipment and processes. (2)
f. Identify and describe alloying techniques for various metals. (2)
g. Identify and explain basic casting processes used in industry. (3)
h. Identify and explain the basic hot metal working processes used in industry. (3)
i. Identify and explain the basic cold metal working processes used in industry. (3)
j. Identify and explain common mass production techniques used in industry. (4)
k. Identify and explain the basic plastic forming processes used in industry. (4)
l. Explain the basic processes, operations and concepts used in making powder metallurgy parts. (4)
m. Identify and discuss concepts related to industrial and occupational safety. (5)
n. Discuss the rationale and operation of the Right to Know and OSHA Acts. (5)

Evaluation

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

Testing Procedures

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.

Final Exam **10 Points**

There will be a comprehensive final exam administered at the end of the course.

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 the minimum requirements, and regular attendance.

Laboratory Experiences

Project 1: Metal Sample Analysis **15 Points**

Project 2: Research and Presentation **20 Points**

Field Work

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

Other Evaluation Methods

N/A

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

Policies

Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the

department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

Academic Dishonesty

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

Accommodations for Disabilities

Students that need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Disability Services (DS) in order to receive accommodations in this course. Disability Services (http://www.pstcc.edu/sswd/) may be contacted via Disability Services email or by visiting Alexander 130.

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 could result in automatic failure of the course