

**PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS**

**WELDING METHODS & PRACTICES
MET 2070**

Lecture/Lab Hours: 4

Credit Hours: 2

Date Revised: Spring 2017

Catalog Course Description

This course is an introduction to modern welding methods, practices, and techniques. Topics include the fundamentals of welding, safety and health issues, welding equipment, materials used in the welding process, materials used for weldments, arc welding with nonconsumable and consumable electrodes, electron and laser beam welding, brazing and soldering, automated and robotic welding, welding design and costs, and quality control and evaluation of welds and weldments.

Prerequisites

MET 1022

Co-requisites

None

Textbooks and Other Supplies

Hobart's Welding Guides

Pocket Welding Guide - A Guide to Better Welding (30th Edition): (EW609)

Week/Topic Basis

Week	Topic
1	Course introduction Fundamentals of welding Safety and health issues
2-3	Welding equipment Electrodes and filler metals Gases used in welding
4-6	Metals and weldability Welding steel and nonferrous metals

	Welding special and dissimilar metals
7-8	Arc welding- nonconsumable electrodes Arc welding- consumable electrodes
9-10	Electron and laser beam welding Brazing and soldering Automated and robotic welding Welding-related processes
11-13	Welding design and costs Quality control and evaluation of welding Team Project Work
14	Team Project Work
15	Final Exam/Final Project/Presentation

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 goals of the Engineering Technology Program.

The course will

1. Guide students to identify and explain basic welding processes, methods, and procedures. (A)
2. Guide students to name and define safety rules and hazards associated with welding. (A)
3. Guide students to identify different kinds of electrodes, filler metals, and welding gases. (A,B)
4. Expand student understanding of weldability for ferrous, nonferrous, special, and dissimilar metals. (A,B)
5. Guide students to define the aspects of arc, electron, laser, and automated welding. (A,B)
6. Guide students to define and explain the difference between brazing and soldering. (A,B)
7. Enhance effective creation and development of a weldment design and then calculate its cost. (A,B)
8. Expand student understanding for analyzing and developing a quality control and evaluation plan. (A,B,D,E,F)
9. Expand student understanding of preparing a report and present a basic "design to evaluation" cycle for a weldment. . (A,B,D,E,F)

Expected Student Learning Outcomes

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

The student will

- a. Classify and explain welding processes and methods of application. (1)
- b. Explain and demonstrate welding procedures. (1)
- c. List and explain personnel protection and safety rules. (2)
- d. Identify and define electrical shock, arc radiation, air contamination, and compressed gas hazards. (2)
- e. Distinguish between transformer, rectifier, and inverter welding machines. (3)
- f. Identify and describe the three types of welding electrodes. (4)
- g. Identify and describe the three types of welding gases. (4)
- h. Categorize and compare metals regarding welding heat and welding metallurgy. (5)
- i. Compare and contrast welding of carbon, alloy, stainless, and high-strength steels. (5)
- j. Identify and describe the welding of aluminum, copper, nickel-base and magnesium-based alloys, reactive and refractory metals. (5)
- k. Identify and describe shielded metal, flux-cored, and submerged arc welding. (6)
- l. Compare and contrast resistance, electron beam, and laser beam welding. (6)

- m. Identify and describe automated welding methods in current use. (6)
- n. Compare and contrast brazing and soldering materials and joining techniques. (7)
- o. Create and implement a weldment design and calculate its estimated cost. (8)
- p. Analyze a weldment design and formulate a quality control plan for evaluation. (9, 10)
- q. Prepare a comprehensive report based on individual and collaborative effort. (10)
- r. Prepare an oral presentation using Microsoft PowerPoint through individual and collaborative effort. (10)
- s. Deliver an oral presentation using proper speech techniques. (10)
- t. Utilize computer based word-processing and discipline-related software. (10)
- u. Develop, analyze, edit, and complete a project in a teaming environment. (10)
- v. Demonstrate ability to function as an active and effective team member. (10)

Evaluation

Total evaluation will be based on the following point distribution.

Testing Procedures

Unit Exams

30 points

There 5 exams administered during the course. They will include discussion questions, short answer questions, true/false questions and problem solving.

Laboratory Experiences

Individual Projects

35 points

The instructor will provide guidelines and requirements for each project.

Team Projects

35 points

Presentation, Report

Field Work

N/A

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