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| **Weld 265**  **Advanced Arc Welding/GTAW.**  **COURSE SYLLABUS** | | |
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| Instructor: | Martin Wolfe | Term: | Fall 2014 | |
| Office: | T145 | Class Meeting Days: | Tuesday | |
| Phone: | 708-709-7807 | Class Meeting Hours: | 8:00am–12:40pm | |
| E-Mail: | mwolfe@prairiestate.edu | Class Location: | T186 | |
| Website: | [www.prairiestate.edu](http://www.prairiestate.edu) | Lab Location: | T165 Welding lab | |
| Office Hours: | Tues, Wed, Thurs, 1-5pm |  |  | |
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**Welcome!**

Thank you for taking the time to enroll in the program as it will be one of the most rewarding processes that you will go through. I look forward to an exciting semester which will challenge you and be a lot of fun at the same time.

**Course Overview**

Advanced gas tungsten arc welding techniques are taught. Topics include types of equipment and supplies, equipment set-up, and open-root welding on plate and pipe. Principles and techniques of pipe welding Includes introduction to pipe layout and drawing equipment. Also includes an introduction to performance testing, types of pipe, methods and preparation of pipe joints and miter joints, methods of joining pipe and miter joints.

**Course Prerequisites**

Weld 215

**Course Credits**

3 credit hours

**Required Texts and Materials**

Text: Welding, principles and applications; Jeffus, Larry

**Expected competencies/outcomes**

At the completion of this course, the students will, given the appropriate special tools and equipment, be able to safely perform the attached list of tasks with a degree of proficiency and in a period of time deemed satisfactory by the instructor.

**Disability Access:**

Prairie State College is committed to providing reasonable accommodations for all persons with disabilities. This syllabus is available in alternate formats upon request. Students who need accommodations must be registered with Student Disability Services,

**Attendance Policy**: Attendance is expected and records will be maintained. Consistent attendance is essential for success in this course. Tardiness and leaving class/lab early will also be noted. People entering the classroom late should take the instructor and students into consideration. Poor attendance not only denies the individual student instruction but also denies the class of the unique perspective of that student. For these reasons, on the third absence, the final letter grade will be lowered one full letter grade. Each additional two absences will lower your final grade an additional letter.

**Professionalism Policy**:

Per college policy and classroom etiquette; mobile phones, iPods, *etc*. **must be silenced** during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, *etc*., and have been warned may suffer a reduction in their final class grade.

**Academic Conduct Policy**:

Academic dishonesty in any form will not be tolerated. If you are uncertain as to what constitutes academic dishonesty. As in all College courses, The student handbook Rules of Conduct will be applied. Violations of these rules will result in a record of the infraction being placed in your file and receiving a zero on the work in question AT A MINIMUM. At the instructor’s discretion, you may also receive a failing grade for the course. Confirmation of such incidents can also result in expulsion from the College

**Methods of Evaluation:**

The norm expected in the workplace is “Excellence”. The same is expected of your work in this course.

Grading criteria:

Quizzes 15% Excellent performance (your best) earns you an A

Homework 10% Good performance (moderate effort) earns you a B

Midterm Exam 15% Mediocre performance (little effort) earns you a C

Final Exam 20% Poor performance (minimum effort) earns you a D

Attendance/Classroom 10%

Participation

Shop/Lab 30%

**Course goals and objectives:**

**Upon successful completion of the course, the student will be able to:**

1. Describe the health, safety, and environmental practices used in the Gas Tungsten Arc Welding (GTAW) process.
2. Describe the welding terminology used in the GTAW process.
3. Describe the operation and assembly of power supplies, foot pedals, torches, and gas regulators used in the GTAW process.
4. Demonstrate the GTAW equipment assembly and techniques used.
5. Describe the proper uses and settings of the power source controls.
6. Demonstrate the proper uses and settings of welding currents and polarities.
7. Describe the types and sizes of tungsten electrodes used in the GTAW process.
8. Describe types and characteristics of shielding gases used in the GTAW process.
9. Demonstrate basemetal preparation, procedures, and techniques for mild steel welding.
10. Demonstrate basemetal preparation, procedures, and techniques for aluminum welding.
11. Demonstrate basemetal preparation, procedures, and techniques for stainless steel welding.
12. Describe the types and specifications for GTAW certification.
13. Describe processes, standards and codes for performance testing.
14. Describe types of pipe, pipe standards and codes.
15. Explain the what, where, how, and why of pattern layout for pipe fabrication.
16. Use drawing equipment required for pattern layout.
17. Setup and draw connections for pipe.
18. Cut and bevel pipe using the freehand and machine techniques.
19. Demonstrate methods of joining pipe in vertical, horizontal and 45° fixed positions.
20. Demonstrate coping and mitering procedures.
21. Demonstrate fit-up, tacking and welding procedures.

**Detailed topical course outline:**

1. Health, Safety, and Environmental Practices **Chapter 1-2 Review**
   1. Eye Protection
   2. Protective clothing
   3. Equipment handling
   4. Safety features to GTAW process
   5. Occupational Safety and Health Administration (OSHA) regulations
2. Welding Terminology **Chapter 20**
   1. Dictionary of welding terms
   2. Applications
3. GTAW Process and Equipment **Chapter 15**
   1. Process of operation
   2. GTAW parameters and variables
   3. Power sources
   4. Types of foot pedals
   5. Welding torches
   6. Gas regulators
4. Equipment Operation and Techniques **Chapter 16**
   1. Assembly of the GTAW equipment
   2. Starting the arc
   3. Torch angles
   4. Oscillating the torch
   5. Adding the filler rod
   6. Speed of travel
5. Power Source Types and Controls **Chapter 17**
   1. Types of power sources
   2. Manual power source controls on panel
   3. Polarity control
   4. Amperage control
6. Welding Currents and Polarities **Chapter 22**
   1. Types of welding currents and their uses
   2. Types of polarities in the current and their uses
7. Tungsten Electrodes **Chapter 23**
   1. Types and sizes of tungsten electrodes used in welding projects
   2. Care of the tungsten electrode
8. Shielding Gases
   1. Types of shielding gases used in different types of basemetal welding
   2. Characteristics of the shielding gases
9. Mild Steel Welding **Chapter 24**
   1. Basemetal preparations
   2. Welding procedures and techniques
   3. Flat, vertical, and horizontal positions
10. Aluminum Welding **Chapter 25**
    1. Basemetal preparations
    2. Welding procedures and techniques
    3. Flat, vertical, and horizontal positions
11. Stainless Steel Welding **Chapter 26**
    1. Basemetal preparations
    2. Welding procedures and techniques
    3. Flat, vertical, and horizontal positions
12. GTAW Certification **Chapter 27**
    1. Types of GTAW certifications
    2. GTAW codes and specifications
13. Introduction to Performance Testing **Chapter 28**
    1. Processes
    2. Standards and codes
    3. Organizations
    4. Classifications
       1. American Welding Society qualifications codes
       2. American Petroleum Institute qualification codes
       3. American Society of Mechanical Engineers qualification codes
14. Types of Pipe **Chapter 29**
    1. Schedules of pipe
    2. Steel alloy pipe
    3. Pipe standards and codes
15. Introduction to Pipe Layout
    1. What is pattern layout?
    2. Where is it used?
    3. How is it used?
    4. Why is it used?
16. Drawing Equipment
    1. Drawing board
    2. T-Square
    3. Triangles
    4. Scale
    5. Dividers
    6. Compass
    7. Bow spacers
    8. Pencils
17. Pipe to Pipe
    1. Miters
    2. Copes
18. Methods and Preparation of Pipe Joints and Miter Joints
    1. Butt joint
    2. Tee joint 90°
    3. Branch joint
    4. Bevel angles
    5. Set up of pipe test
19. Methods of Joining Pipe and Miter Joints
    1. Layout
    2. Tacking procedures
    3. Welding procedures
    4. Selection of filler rods
    5. All positions
20. Preparation of Pipe Test
    1. Bevel angle
    2. Set up of test plate for end test
    3. Set up of test plate for x-ray test
    4. Cutting test coupons for bend test
21. Methods of Welding Pipe Test
    1. Tacking procedures
    2. Welding procedures
    3. Finishing methods
    4. Selection of filler rods
    5. All position procedures and techniques
    6. Bend tests