

Lakeland Community College COURSE SYLLABUS

WELD 2380 GTAW (TIG) Pipe Welding 3 credits

Lecture

Lab CRN

Instructor: NAME OF INSTRUCTOR

Contact: Email: alternate:

Phone: cell: alternate:

Textbook Required:

HELP/TUTORING:

Available at the Learning Center Office, Rm A1044 Phone 525-7019

COURSE DESCRIPTION:

This course introduces students to the Gas Tungsten Arc Welding (GTAW) American Society for Mechanical Engineers (ASME) pipe welding standards. Students will develop their welding skills and prepare for Certification of Qualification in ASME Section IX Code. Laboratory sessions will provide hands-on time to develop skills to produce quality welds with GTAW process on pipe. At the conclusion of this course, students take either a 5G or 6G pass/fail welder qualification test using the GTAW process according to the ASME Section IX code. The course covers functions and specific uses of manual welding equipment, various GTAW welding techniques, prepping and fitting of pipe coupons, and welding certification requirements. The student must furnish: long pants; welding helmet (shade #10 or above); safety glasses; work gloves; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; tool bag; center punch; and 12 oz. ball peen hammer. 4 1/2" grinder is optional.

RATIONALE FOR COURSE:

This course is designed to introduce students how to prep, fit, tack, and GTAW weld pipe to the ASME Section IX standards in the 2G, 5G and 6G pipe position.

COURSE OBJECTIVES, at the conclusion of this course, the student should be able to:

1. Describe the various safety hazards involved in gas tungsten arc welding.
2. Describe the safety equipment and its function in welding.
3. Weld 6" schedule 40 & 80 pipe to ASME standard in 2G, 5G & 6G position.
4. Properly set the machine controls for the transformer, rectifier, and motor generator power sources for the specific welding task.
5. Produce an acceptable pipe weld in the 2G, 5G and 6G positions using the Gas tungsten arc welding method.
6. Produce an acceptable vertical up root pass with the GTAW process to the ASME code.
7. Produce an acceptable vertical up fill and cap weld using GTAW electrode to the ASME code.
8. Produce an acceptable vertical up GTAW 6" sch. 40 & 80 test pipe and bend specimens.
9. Describe the qualification tests used by ASME code.
10. Demonstrate proficiency in the proper welding and fit up technique on the GTAW process in the 5G or 6G position according to the ASME Section IX code as taken from the pipe prepared and tested by the Instructor.

COURSE OUTLINE

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| I. | Pipe Welding and Code Standards |
| A. | ASME |

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1. American Society of Mechanical Engineering
 - a. Most of the time done in the up-hill position
 - b. Power plants in house piping
- II. Safety
- A. E205 safety hand out
 - B. ANSI Z49.1
 - C. MSDS Sheets
 - D. Safety Glasses
 - E. Warning
 - F. Safety Label
- III. Positions for Pipe Welding
- A. 1G Rotated parallel to the ground
 - B. 2G Fixed Pipe vertical weld is horizontal
 - C. 5G Fixed pipe parallel with ground weld in vertical position
 - D. 6G Fixed pipe at a 45 degree angle weld in a compound angle (Arkansas)
 - E. 6GR fixed pipe at 45 degree angle with a restrictor plate around the pipe weld at a compound angle
- IV. ASME Fit Up
- A. Bevel angles
 1. Degrees
 2. Root face (land)
 - a. Knife edge
 3. Root opening (gap)
 - a. 3/32 or 1/8
 4. Typically welded vertical up
- V. Pipe Welding Fit Up
- A. Root face (land)
 1. Grinder
 2. File
 3. Mechanical beveller
 - B. Root opening (Gap)
 1. Bare electrodes
 2. Nickle or a dime
 3. Sheet metal shims
 4. Anything that is equal to the gap on the pipe
 - C. Internal alignment of the pipe (high Low)
- VI. Tack Up
- A. Tack
 1. ½" to ¾" long
 - a. If it tack good it will weld good
 - b. Adjust your amps while you are tacking up your pipe
 - B. 12 o'clock
 - C. 6 o'clock
 - D. 3 o'clock
 - E. 9 o'clock
- VII. Transitions On To Tacks
- A. Trim filler at a 45degree angle so it fits into transition of the tack weld
- VIII. Root Pass
- A. Walking the cup technique 5 or 6 cup
 1. ASME
 - a. DC- 1/8" 100% argon 15 to 20 CFH 105 to 110 amps ER70s-6 filler
- IX. FILL PASSES (COULD BE MULTIPLE PASSES) ASME
- A. 6 or 7 cup

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- 1. 2 point contact 1st 3 passes
 - B. 4 out to cap pass
 - 1. 7 or 8 cup 3point of contact
 - C. Cap pass 8 cup
 - 1. Figure 8 technique
 - X. GTAW PROCESS
 - A. Tungsten
 - 1. Non consumable electrode
 - 2. EWX AWS numbering
 - B. Argon 100%
 - 1. CFH 15 20
 - C. Polarity
 - 1. DC-
 - D. Power source
 - 1. Constant Current CC
 - XI. CUP WALKING
 - D. 5 or 6 cup on the root
 - E. 6 or 7 cup fill pass
 - F. 8 or 10 cup
 - XII. Welder Qualification Test
 - A. Hands-on skills test of student's ability to make acceptable GTAW welds
 - 1. Take a 6G Certification of Qualification test in the GTAW process according to the ASME Section IX code.
 - 2. Pass/fail test
 - 3. Industry Recognized Certification of Qualification is awarded to students passing independent 3rd party test of welds made using a qualified or pre-qualified Welding Procedure Specification
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FEDERAL CREDIT COMPLIANCE STATEMENT:

It is expected that students will spend two to three hours, minimally, outside of the classroom/laboratory performing course related work such as reading, research, homework assignments, practice, studio work, and other academic work for every hour of instruction spent in the classroom/laboratory.

STUDENTS WITH DOCUMENTED DISABILITIES:

Lakeland Community College is committed to providing all students equal access to learning opportunities. The Student Accommodation Center works with students with documented disabilities to provide and/or arrange reasonable accommodations. If you have a disability (e.g. learning, attention, psychiatric, vision, hearing, physical, or systemic) and feel it may create a barrier to your education, contact the Student Accommodation Center at 440-525-7020 or stop by the office, Room A-1042.

SUBSTANCE ABUSE NOTICE:

The Lakeland Community College Welding Program is committed to a safe learning environment in the classroom and the laboratory. Students are expected to report to lecture and lab classes properly prepared and unimpaired by alcohol and/or drugs. If the instructor believes a student is under the influence of alcohol and/or drugs, the instructor will ask the student to leave the classroom to ensure the health and safety of all students. Any student asked to leave the classroom faces potential Student Conduct Code charges.

ACADEMIC INTEGRITY:

Honesty, as the basic component of trust is essential to both individual and institutional integrity. With this premise in mind, Lakeland Community College has set forth certain behaviors as being forms of academic misconduct, and thus potentially diminishing Lakeland's integrity, reputation for academic quality, and ability to function as an academic community. The institution's faculty and administration, therefore, regard academic misconduct as a serious offense. Established as violations of academic misconduct at Lakeland Community College are cheating, plagiarism, fabrication of material included in academic work, denying others access to information or material, enabling academic misconduct, and deception in order to gain academic advantage. Policies dealing with violations of academic misconduct may be obtained by visiting <http://www.lakelandcc.edu/web/about/student-development> or from the Student Development Office.

GRADING:

The final grade for this three-credit hour course will be calculated based on scores achieved on attendance, homework, quizzes, a midterm exam and a final exam. The instructor has the option of grading on a curve if the average grade is less than 80%.

91 – 100%	= A	BASIS FOR GRADES:	
83 - 90.99%	= B	Attendance (Missing 20% of classes = 0) ---	20%
75 – 82.99%	= C	Homework -----	10%
68 – 74.99%.....	= D	Laboratory Assignments-----	15%
67.99 or below	= F	Quizzes -----	10%
Failure, non-attendance	= FNA	Midterm -----	20%
		Final Exam -----	25%
		Total --- 100%	

ATTENDANCE (20% of final grade):

Attendance is a very important part of this course since the Instructor will at times be presenting and explaining information in the lecture sessions that will not be in the text book but may be included in quizzes and exams. Furthermore, employers expect employees to show up on time for every scheduled work day and this attendance requirement is intended to help students develop this ability.

ON THE FIRST DAY OF CLASS: You should make arrangements with two or more classmates so if you are late or have to be absent you can get any missed assignments from them. As you are expected to attend every class it is not the instructor's responsibility or obligation to re-teach material to students who are absent.

IF YOU ARE LATE OR ABSENT: A student can be late for class one time; thereafter, arriving late will count as being absent for half a class. This course consists of 16 classes, so each class missed will reduce student's final course score by 6.25% and missing three classes will result in 20% of students final course score being zero.

LABORATORY WORK/HOMEWORK: (25% of final grade):

Students will frequently be given laboratory work or homework assignments, such as answering end-of-chapter questions or completing an alternate assignment handed out in class, such as measuring lines or distances, creating a 3-view drawing, putting weld symbols on a drawing, etc. Homework turned in late will only get half credit. Students will, however, be given an opportunity to make up lost points by (a) participating in voluntary plant tours or (b) researching the facility offering the tour and then writing a cover letter with a resume applying for employment at that facility and submitting it to the class Instructor or (c) attending an American Welding Society meeting or event.

QUIZZES: (10% of final grade):

Quizzes will not necessarily be announced in advance; therefore, it is important for students to arrive on time for every class. Students who arrive late to class will not be given additional time to complete a quiz. In this course the lowest quiz score will be dropped when the student's course grade is being calculated. Students will not be allowed to make up a missed quiz. The Instructor has the discretion to include pop-quizzes as part of their teaching method and students should be prepared for this to be done in this course.

EXAMS: (Midterm – 25% of final grade; Final – 25%):

Exams will commence and terminate at the pre-announced time. It is the student's responsibility to arrive on time and complete the exam within the stated time. No additional time will be given. If a student is ill on the scheduled Midterm or Final Exam dates, he/she must phone the Instructor at least one hour before the exam is to begin. If you reach voice mail or an answering machine leave a message, clearly stating and spelling your first and last names and provide your telephone number including area code. In this message, state when you plan to take the missed exam in the Lakeland Learning Center testing room (A-1040). **NOTE: The exam must be taken within 48 hours of its scheduled administration time to avoid penalty unless an alternate time is arranged with the Instructor before the 48 hour deadline has passed.** Students must provide a picture ID for the Testing Center monitor. The student is responsible for determining Testing Center hours.

COURSE POLICY:

The policies and procedures for this course shall be consistent with the college policies and procedures explained in the current Student Handbook and Calendar.

Cell phones are to be turned off or silenced in class and lab, and photographing or video recording of class sessions and/or materials presented is not allowed without the Instructor's permission. Cell phones cannot be used during quizzes or exams, and the Instructor reserves the right to collect and hold them while quizzes or tests are being taken. Non-compliance with this policy may result in a student being expelled from class.

Adds, drops, and withdrawals are per standard policies of Lakeland Community College. A student's failure to attend the class does not constitute a withdrawal and will ultimately lead to a failing grade. Those who wish to withdraw from class should contact the Counseling Center to initiate the withdrawal procedure.

For cancellations due to bad weather, call the Lakeland Emergency Closing Hotline at (440) 525-7242, or check Lakeland's web page, local radio or TV stations.

Methods of Presentation:

Text book reading assignments

Lecture

Audio/Visual Media

Demonstration

On-line presentation

Individualized instruction

The policies, requirements and other information contained in this syllabus are subject to change at the discretion of the Instructor

LAKELAND COMMUNITY COLLEGE'S MISSION STATEMENT:

"To provide quality learning opportunities to meet the social and economic needs of the community."

Lakeland Community College Learning Outcomes

Learns Actively

Thinks Critically

Communicates Clearly

Uses Information Effectively

Interacts in Diverse Environment

Essential skills for personal and professional growth

COURSE SCHEDULE:

Class #	Date:	Topic:	Preparation/Comments:
1			
2			
3			
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The course and services are available without regard to a participant's race, color, religion, ancestry, age, handicap, sex, marital status or national origin. The number for TDD/TYY or relay services is 440-525-7006.

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