

Lakeland Community College COURSE SYLLABUS

WELD 2320 Advanced SMAW (Stick) Welding 2 credits

Lecture

Lab

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 advanced concepts of design and production of many types of weldments used in industry, with emphasis on proper design, set-up, trouble shooting, and techniques to produce cost effective fillet and groove welds in the vertical and overhead positions using the Shielded Metal Arc Welding (SMAW) process. Laboratory experience includes skill development in advanced SMAW welding techniques, along with project-based learning concepts, blueprint reading, manufacturing of projects, fabrication technique, and producing fillet and groove welds in the vertical and overhead positions. At the conclusion of this course, students take either a 3G or 4G pass/fail welder Certification of Qualification test using the SMAW process. The student must furnish: welding helmet (shade #10 or above); safety glasses; work gloves; long pants; 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 provides practical welding experience and knowledge for students wanting to gain an in-depth understanding of SMAW (Stick) Welding and produce fillet and groove welds in the vertical and overhead positions. This course will provide a pathway for employment in a welding field and for welding certification.

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

1. Describe the various safety hazards involved in SMAW welding, including those associated with producing a fillet and groove weld in the vertical and overhead positions.
2. Properly set the machine controls for the transformer, rectifier, and motor generator power sources for producing a fillet and groove weld in the vertical and overhead positions.
3. Produce acceptable vertical up and overhead fillet and lap welds employing proper techniques and settings using E6010 and E7018 electrodes.
4. Produce acceptable vertical down fillet and lap weld employing proper techniques and settings using E6010 electrode.
5. Produce acceptable vertical up and overhead 1" bevel test plates using E7018 electrodes.
6. Demonstrate the difference in techniques used when producing a fillet and groove weld in the vertical and overhead welding positions compared to the flat and horizontal positions.
7. Read and understand a simple shop drawing or print and use standard measuring instruments to lay-out a component part or assemble a weldment.

8. Describe the tests as used by AWS and the American Society of Mechanical Engineers (ASME) to qualify welders for making welds in the 3F, 4F, 3G, and 4G positions, and demonstrate the proper welding techniques according to the respective codes.
9. Demonstrate proficiency in the SMAW process in the 3F, 4F, 3G, and 4G positions by producing weld test plates that meet the applicable AWS bend test requirements as taken from the plates prepared and tested by the Instructor.

COURSE OUTLINE

Considerations Related to Advanced Shielded Metal Arc Welding

- A. Safety concerns when using SMAW in the vertical and overhead positions
 1. Personal Protective equipment - includes ear plugs (explain)
 2. Fumes and gases - type items worked on makes of greater concern
 3. Electric shock can kill - more danger when in confined spaces
 4. Burns - more concern as to molten metal falling on welder
 5. Falls - much more likely than when welding in vertical and overhead positions
 6. UV and IR rays - always a concern
- B. Changes in the characteristics of electrodes for advanced welding
 1. Flux is different - it has to solidify faster, so less fluid
- C. Welding current
 1. Must be more carefully selected and useable range is smaller
- D. Electrodes
 1. Electrode size is limited - if too big weld pool hard to control
 2. Cannot use electrodes in fast fill group
- E. Power sources
 1. Constant current type - typically transformer rectifier, DC motor generator, inverter or rectified alternator

II. Manipulative Variables and Techniques for Producing Fillet and Groove Welds in the Vertical and Overhead Positions

- A. Manipulative variables not set at same values as for basic welding
 1. Travel speed - typically slower
 2. Travel angle - depends on specific situation
 3. Transverse (work) angle - usually similar
 4. Tip to work distance - will sometimes be different
 5. Tip location - depends on position and if single or multi-pass
- B. Manipulative Techniques
 1. Drag - often used
 2. Whip - Not used except sometimes for root pass
 3. Special weave patterns used for most welds
- C. Rod angles and bead placement
 1. Rod angles and when used
 - a. 45 degrees
 - b. 60 degrees
 - c. 30 Degrees
 2. Proper placement for vertical and overhead welds
 - a. Coverage
 - i. 1st pass even in the corner
 - ii. 2nd pass cover 1st pass 75 to 90%
 - iii. 3rd pass cover 2nd pass 50%
 3. Beads must be fairly uniform
 - a. Best technique
 - b. 6010 and 6011
 - i. Whip rod and stack ripples
 - c. All other electrodes we drag and/or weave
 4. Good wash-in - critical
 - a. Undercut (concave)
 - i. Too hot
 - ii. Too fast
 - iii. undercut on one plate not the other wrong rod angle.
- D. Special manipulative techniques difficult to learn

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- 1. Requires extensive practice and careful attention to detail
 - 2. Welds must be made per welding procedure specification
 - E. Arc blow
 - 1. Arc blow is a phenomenon encountered in DC welding current where the magnetic field does not follow the shortest path
 - a. occurs beginning and end of the plates
 - b. can be encountered when welding in advanced positions
 - F. Vertical up vs vertical down
 - 1. 1/4" rule
 - a. 1/4" and thicker vertical up
 - b. 1/4" and thinner vertical down

III. Project Experience

- A. Introduction to Reading Prints and Shop Drawings
- B. Use of tape measure and measuring instruments used in fabricating
- C. Review of math involving fractions

IV. Welder Qualification Test

- A. Hands-on skills test of student's ability to make acceptable SMAW welds
 - 1. Take either 3G or 4G Certification of Qualification Test in the SMAW process
 - 2. Pass/fail test

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

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	<u>BASIS FOR GRADES:</u>	
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%
		<u>Final Exam -----</u>	<u>25%</u>
			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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