Lakeland Community College COURSE SYLLABUS

WELD 1330 Basic GTAW (TIG) Welding 3 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 basic concepts involved in using the Gas Tungsten Arc Welding (GTAW) or (TIG) process to produce cost effective fillet and groove welds in the flat and horizontal positions. Welds are made in carbon steel, stainless steel, and aluminum. Familiarization with the equipment, set up, materials, and the manipulation technique are emphasized. Students must furnish: long pants; welding helmet (shade #10 or above); safety glasses; work gloves; welding jacket; leather work boots, preferable steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; center punch; 12 oz. ball peen hammer; and tool bag. 4 1/2" grinder is optional.

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

1. Identify and apply safety procedures when working with welding equipment.
2. Identify 5 basic joint types and different weldment positions.
3. Produce an acceptable T, lap, butt, corner and edge joint in the flat and horizontal position on aluminum, carbon, and stainless steel utilizing the GTAW (TIG) process.
4. Describe the complete functionality of a GTAW welding machine.
5. Troubleshoot the GTAW machine and process to ensure proper settings and production of quality weldments.
6. Demonstrate proficiency in the GTAW process by producing welds in carbon steel, stainless steel and aluminum in the 1F. 2F. 1G & 2G positions that meet the visual inspection quality requirements of the AWS D1.1 code.

COURSE OUTLINE

I. Safety

- A. Personal protective equipment
- B. Fumes and gases
- C. Electric shock can kill
- D. Fire and explosion
- E. Arc rays can burn

F. Safe handling of compressed gas cylinders and related equipment

II. GTAW

A. Gas tungsten arc welding
1. Alternate names for GTAW
a. Gas tungsten arc welding
b. Tungsten Inert Gas (TIG)
c. Heli-Arc

III. Electrodes

A. Tungsten or alloyed tungsten
1. Non consumable electrode

IV. Shielding Gases

A. Inert gas =is a chemically unreactive and will not form a compound or react with the molten base metal
1. Argon
2. Helium
3. Neon
4. Krypton
5. Xenon
B. Active gas = is reactive and will have a chemical reaction with the molten base metal

V. Shielding Gasses for GTAW Advantages and Disadvantages

A. Argon

1. Transfers less heat at 19 to 20 volts

2. Better resistance to cross draft

3. More abundant & low cost

B. Helium

1. 1.7 times hotter arc then the arc of argon

2. Transfer more heat 23 to 24 volts

VI. Gas Flow

A. SCFH Standard Cubic feet per hour
B. Argon15 to 20 scfh
C. Helium
1. 45 to 60 scfh

VII. Regulators

A. Flowmeter / pressure regulator
B. Cylinder pressure gauge
C. Cylinder valve stem

VIII. Power Sources

A. Constant Current
1. SMAW

2. GTAW

B. Constant Voltage
1. FCAW

2. GMAW

IX. Current and Control Devices

A. Foot
B. Hand

X. Polarity

A. AC Alternating polarity

1. Aluminum

a. DC- Penetration

b. DC+ Cleaning

B. DC-

1. 70% heat in the plate
2. 30% in the electrode

C. DC+
1. 70% heat in the electrode

2. 30% heat in the plate

XI. High Frequency

A. Continuous
1. AC Aluminum and magnesium only
B. Start only
1. DC- only
C. Off
1. SMAW only

XII. Sine Wave Vs Square Wave

A. Arc re-ignition
B. Wave form percentages

XIII. Pulse

A. Pulse per second
B. Background current
C. On time

XIV. Electrode Selection and Shape

A. Types EWX
1. Red, green, Brown, Grey
B. Thoriated types
1. Slightly radioactive
2. Not harmful unless grinding dust is inhaled

C. Sharpening and prepping
1. Conical

2. Balling

XV. AWS Filler Classification

A. Sizes typically used
B. ER70S-X
    1. E-electrode
    2. R-rod
    3. 70-min. tensile strength
    4. S-solid
    5. X-chemistry
C. Stainless
    1. 308L
    2. 309L
    3. 316L
D. Aluminum
    1. 4043
    2. 5356
E. Silicon Bronze
    1. ERCuSi-A

XVI. TIG Torch

A. Water cooled

B. Air cooled

XVII. TIG Torch Parts

A. Back caps
B. Collet
C. Collet body
D. Nozzle
E. Gas lens

XVIII. Start Controls

A. Preflow
    1. Gas before welding
B. Start control
    1. Current at which arc initiates
C. Upslope
    1. Time arc initiation to maximum current

XIX. End Controls

A. Finish current
    1. Current at which the arc is terminated

B. Down slope
    1. Time in seconds arc goes form max output to finish current

C. Post flow
    1. Gas flow after arc is terminated

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			
4			
5			
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