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WLDG 275.01: Gas Metal Arc Welding

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**THE UNIVERSITY OF MONTANA
MISSOULA COLLEGE
INDUSTRIAL TECHNOLOGY DEPARTMENT**

COURSE SYLLABUS

COURSE NUMBER AND TITLE: WLDG 275 Gas Metal Arc Welding

DATE REVISED: Spring 2016

SEMESTER CREDITS: 4

PREREQUISITES: WLDG 187 Flux Cored Arc Welding

Instructor: Zachary Reddig

E-Mail: Zachary.reddig@umontana.edu

(According to new Federal and UM policies I cannot answer any email that does not come from an official UM email address; no Hotmail, AOL, yahoo, gmail, etc.)

Phone: 243-7644

Office: Welding Lab Office

Office Hours: By appointment or as posted on Faculty office door.

RELATIONSHIP TO PROGRAM(S):

This class provides theory of operations and skill development with a process that is primary in the welding of carbon steel, stainless steel, and aluminum. This experience complements the other welding processes taught in the program to attain a solid, broad based understanding of welding as an industrial metals joining process.

COURSE DESCRIPTION:

Theory and safe operation of Gas Metal Arc Welding (GMAW). Theory of flux core arc welding applied to GMAW. Primary focus on application, practical skill development, and producing welds that meet AWS and industry standards. Metals welded are low carbon steel, stainless steel, and aluminum. Short circuit arc, spray arc, and pulse transfer are used. Examination of gas and electrode selection.

STUDENT PERFORMANCE OUTCOMES:

Occupational Performance Objectives

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

1. Students will learn practical skills through operation of GMAW equipment
2. Students will become proficient in the technical applications applying industrial terminology and concepts to the GMAW process.
3. Students will apply welding skills to industrial quality standards of ASME Section IX-Boiler and Pressure Vessel Code.
4. **All Students will be able to successfully execute and pass a fillet weld break and macroetch test as according to D.1.1- Structural Welding Code. Those students that successfully pass the fillet weld break and macroetch test on the 1st testing sequence will qualify to test to ASME Section IX- Boiler and Pressure Vessel Code.**
5. **Qualified students from the fillet weld break and macroetch test will be able to successfully execute and pass a 1G limited thickness plate test to ASME Section IX-Boiler and Pressure Vessel Code. Tests will be visually inspected by instructor (Zachary Reddig) and upon passing visual criteria, the test can be radiographed by Harris Thermal Transfer Products at their plant in Newberg, OR. If the radiographed weld passes inspection from Harris, they would give a technical**

endorsement.

STUDENT PERFORMANCE ASSESSMENT METHODS AND GRADING PROCEDURES:

Grading Scale:

A= 100%- 90%
B= 89%- 80%
C= 79%- 70%
D= 69%- 60%
F= 59%- 0%

NOTE: Courses must be passed with a 'C minus (C-)' or greater to count toward degree/certificate requirements.

Grading Breakdown:

Lab Work	50%
Exams	30%
Quizzes	10%
Notebook	5%
Professionalism	5%

Practical Welding Tests: Hands-on welding tests based on lab assignments. Upon successful completion of lab assignments a hands on welding test derived from written specifications and graphics (drawings) will be administered. It will be graded based upon execution ie. fit-up, weld profile, workmanship, etc. as prescribed by AWS standards and the instructions given at the time of the test.

- **All Students will be able to successfully execute and pass a fillet weld break and macroetch test as according to D.1.1- Structural Welding Code. Those students that successfully pass the fillet weld break and macroetch test on the 1st testing sequence will qualify to test to ASME Section IX- Boiler and Pressure Vessel Code.**
- **Note: *Technical Endorsement tests are not reflective to course grades:* Qualified students from the fillet weld break and macroetch test students have a chance to be given a technical endorsement to a 1G limited thickness test as to ASME Section IX- Boiler and Pressure Vessel Code.**

Written Exams: Exams based on class lectures, reading assignments given in class, homework, notes from class video presentations, etc. **No make-up exams will be allowed.**

Quizzes: Short impromptu tests given on reading assignments, demonstrations, lectures. Composed of student name/date and three questions. Name and date are worth 25%. Each question is worth 25%. To receive credit for questions the question must be written out and answered correctly. Quizzes may be given at anytime during the course scheduled meeting time. **No make-up quizzes will be allowed.**

Notebook: Compilation of class notes and handouts. To receive the full 5% credit, the notebook must be neat and organized. It must also be contained or be found contiguous within a three ring binder.

Professionalism: Defined as a combination of attitude, motivation, participation, organization and work area cleanliness as demonstrated on a daily basis in the lab and class.

POLICIES:

- **Safety is required to be practiced at all times. Disregarding safety practices, endangering yourself or others may result in your being denied access to the lab areas.**
- **Eye protection is mandatory at all times in the lab area.**
- **“Make up” exams or quizzes are not given for any reason**
- **Assignments will be docked 10% for each day it is turned in late after the due date.**
- **Cell phones are to be turned off during class time: no texting, calculations, or calls are to be done during class time.**
- **Any forms of cheating during exams or quizzes are an automatic 0.**
- **Students are expected and required to learn how access and navigate Moodle by the end of first week of instruction. These function as supplements to the course.**
- **Attendance is not taken, although you are required to be in attendance to successfully complete the course.**

REQUIRED TEXTBOOKS:

Welding Principles and Practices, 4th Edition; Sachs and Bohnart, McGraw Hill.

SUGGESTED REFERENCE MATERIALS:

The Welding Journal, published monthly by the American Welding Society

REQUIRED SUPPLIES:

1. Welding Helmet with #10 or #11 lens
2. Lightweight Welding Gloves (GTAW)
3. Eye Protection
4. Pliers with wire-cutting capabilities
5. Full size “pipe” hand brush (has tapered grouping of bristles)
6. 4” or 4 1/2” right angle handheld grinder
7. Tape Measure
8. Striker
9. Upper body protection, leathers, coveralls or equivalent
10. Lock for locker
11. Chipping hammer ;)

ACADEMIC INTEGRITY: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umt.edu/SA/VPSA/index.cfm/page/1321>.

DISABILITY ACCOMMODATION: Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at <http://www.umt.edu/dss/> or call 406.243.2243 (Voice/Text).

COURSE OUTLINE

1. Gas Metal Arc Welding (GMAW) theory of operation.

2. Safe operation of GMAW.
3. GMAW power sources.
4. GMAW wire feeders.
5. GMAW torches and related equipment.
6. GMAW electrodes and gases.
7. Practical Welding experience of:
 - a. carbon steel, groove and fillet welds to industry standards.
 - b. aluminum, groove and fillet welds to industry standards.
 - c. stainless steel, groove and fillet welds to industry standards.
8. Codes and standards relating to Gas Metal Arc Welding.
9. Quality assessment of welded components using Gas Metal Arc Welding.

10. Students will be able to successfully execute and pass a fillet weld break and macroetch test as according to D.1.1- Structural Welding Code. Those students that successfully pass the fillet weld break and macroetch test on the 1st testing sequence will qualify to test to ASME Section IX- Boiler and Pressure Vessel Code.

11. Qualified students from the fillet weld break and macroetch test will be able to successfully execute and pass a 1G limited thickness plate test to ASME Section IX- Boiler and Pressure Vessel Code. Tests will be visually inspected by instructor (Zachary Reddig) and upon passing visual criteria, the test can be radiographed by Harris Thermal Transfer Products at their plant in Newberg, OR. If the radiographed weld passes inspection from Harris, they would give a *technical endorsement*.

NOTE: Faculty reserves the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances.