COASTAL BEND COLLEGE
WELDING
SYLLABUS
(Rev. 11/13)

WLDG 1430: Introduction to Gas Metal Arc (GMAW)

Semester Hours: 4

Textbook: Gas Metal Arc Welding Handbook, William H. Minnick

Course Description: Principles of gas metal arc welding, setup and use of Gas Metal Arc Welding (GMAW) equipment, and safe use of tools/equipment. Instruction in various joint designs.

Course Learning Outcomes: The student will describe welding positions with various joint designs on plate; describe safety rules and equipment used; describe the effects of welding parameters in GMAW; and understand safety rules, equipment used, and testing performed by visual inspection. Student will weld various types of structural material and diagnose welding problems and perform visual inspections.

Supplementary Material: Videos, DVD, handout material

Performance Objectives:

1. Given instructions and practice the student will be able to name the various shielding gases, methods of metal transfer, and components of a GMAW station. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by written exam within a 50 minute time period.

   A. Name the four most common shielding gases used in GMAW.
   B. Name four methods of transferring metal across the arc in GMAW.
   C. Name the main components of the GMAW outfit.

2. Given instructions and practice the student will select shielding gases for various metals and setup a GMAW station. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets and by written exam within a 50 minute time period.

   A. Select the proper gas or gas mixture necessary to shield various metals while welding with the GMAW process.
   B. Adjust gas mixture and flow rate necessary to shield the arc while welding with GMAW.
3. Given instructions and practice the student will be able to setup a GMAW station and make the necessary adjustments such as current, wirefeed, voltage, and gas flow necessary to weld on various sizes of mild steel.

A. Assemble the components such as booth, welding machine, wirefeeder, flowmeter, gun, control system, and setup a complete GMAW outfit. Safety will be stressed.

B. Using chart (Fig. 15-7) GMAW handbook text and handout material adjust gas flow, voltage, wirefeed, and current to weld with .035 dia. electrode on various thicknesses of metal.

C. Inspect welding station for safety such as electrical shock, arc flash, and ventilation.

4. Given instructions and practice making welds on fillets and groove plates using the uphill, downhill, push and pull methods of welding on mild steel, and aluminum. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, visual inspection test, and destruction test, according to Welding Society Welding Codes, and by scoring the college minimum satisfactory grade on a written exam within a 50 minute time period.

A. Set machine and weld mild steel on fillets in the flat (1F), horizontal (2F), vertical (3F), and overhead (4F) positions.

B. Set machine and weld on mild steel with a V groove in the flat (1G), horizontal (2G), vertical (3G), and overhead (4G) positions.

Teaching Methods:

1. Individual and group instructions in the lab.

2. Group of two or three students will work together on lab projects.

3. Individual and group instruction in the classroom.

Evaluation Methods:

1. Attendance

2. Lab tests and lab performance

3. Visual test

4. Destructive method using a guided bend tester

5. Written exams
Grading Policy:

Lecture Evaluation 20%
Practical Application (Lab) 80%

Attendance Policy:

Students must attend all classes. Excessive absenteeism will have a detrimental effect on the student grade. Students can be dropped from classes for excessive absenteeism. The instructor will call roll at the beginning and end of each class or any time he/she feels it necessary. Three (3) times tardy will count as one (one) absence. The attendance record starts the first day of class beginning of each semester.

Course Outline:

I. Shielding Gases
   A. Argon
   B. Helium
   C. Nitrogen
   D. Carbon dioxide
   E. Argon/CO2

II. Metal Transfer
   A. Short Circuiting transfer
   B. Globular transfer
   C. Pulsed arc transfer
   D. Spray Arc

III. GMAW outfit
   A. Welding machine
   B. Shielding gas cylinder
   C. Flowmeter and regulator
   D. Wire reel
   E. Wirefeed drive motor
   F. Control system
   G. Manually held gun

IV. Gas Selection for Various Metal
   A. Gases combination for aluminum
   B. Gases combination for magnesium
   C. Gases combination for copper
   D. Gases combination for carbon steel
   E. Gases combination for low alloy steel
   F. Gases combination for stainless steel

V. Setup Welding station
   A. Assemble components
   B. Adjust Variables
   C. Check for safety
**WELDING TECHNOLOGY**  
**COMPETENCY PROFILE**  
GMAW – plate  
(Rev. 8/10)

**STUDENT** ___________________________  
**INSTRUCTOR** ___________________________  
**COURSE**  WLDG 1430  
**SEM./YEAR** ____________________

---

**RATING SCALE:**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Skilled:</td>
<td>Can work independently with no supervision.</td>
</tr>
<tr>
<td>3</td>
<td>Moderately Skilled:</td>
<td>Can perform job completely with limited supervision</td>
</tr>
<tr>
<td>2</td>
<td>Limited Skill:</td>
<td>Requires instruction and close supervision.</td>
</tr>
<tr>
<td>1</td>
<td>No Exposure:</td>
<td>No experience or knowledge in this area.</td>
</tr>
</tbody>
</table>

---

**COMPETENCY**

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifies components and explains function.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifies, selects, and safely handles shielding gases.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifies and selects wire electrode.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sets welding current for correct weld procedure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifies welding problems, their causes, and takes corrective action.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifies, selects joint design, and prepares metal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Names the four methods of transferring metal across the arc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makes lap joint welds on mild steel plate in the flat, horizontal, vertical, and overhead positions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makes open root V-groove plate weld in the flat position. (1G) (carbon steel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makes open root V-groove plate weld in the horizontal position. (2G) (carbon steel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makes open root V-groove plate weld in the vertical position. (3G) (carbon steel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makes open root V-groove plate weld in the overhead position. (4G) (carbon steel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepares weld for test.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passes visual test.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passes Destructive test.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>