Entry Level Welding
Outline of Instruction

Course Information

<table>
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<tr>
<th>Project Type</th>
<th>Course</th>
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<tr>
<td>Organization</td>
<td>Monroe County Community College</td>
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<tr>
<td>Developer</td>
<td>Ed Baltrip</td>
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<td>Development Date</td>
<td>1/2013</td>
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<td>Course Number</td>
<td>WELD-115, Entry Level Welding</td>
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<tr>
<td>Instructional Level</td>
<td>Associate Degree</td>
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<tr>
<td>Instructional Area</td>
<td>Welding Technology</td>
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<tr>
<td>Division</td>
<td>Applied Science and Engineering Technology</td>
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<tr>
<td>Contact Hours</td>
<td>250</td>
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<tr>
<td>Total Credits</td>
<td>12</td>
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Course Description
This course is an introduction into oxy-fuel cutting, shielded metal arc welding, gas metal arc welding and gas tungsten arc welding. Machine functions and filler metal chemistry will be emphasized, as well as code and procedure requirements for a variety of industrial needs. Welding/cutting processes covered (including laboratory applications) include: oxy-fuel cutting (OFC), plasma arc cutting (PAC), CNC plasma/ace cutting, shield metal arc welding (SMAW), gas tungsten arc welding (GTAW) and gas metal arc welding (GMAW). GTAW will be completed on a variety of ferrous and non-ferrous metals.

Major Units:
1. Safety & Health
2. Drawing & Welding Symbols
3. Thermal Cutting
4. Welding Inspection & Testing
5. GMAW
6. FCAW
7. SMAW
8. GTAW

Types of Instruction

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<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
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<tr>
<td>Instruction for this course will include but will not be limited to, demonstration and lab.</td>
<td>250</td>
<td>12</td>
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Prerequisites
RDG 090 and MATH 090 or qualifying scores on COMPASS or ACT tests

Program Outcomes
A. Demonstrate safe welding and thermal cutting practices.
B. Perform cutting procedures using plasma and oxy-fuel techniques.
C. Follow procedures to deposit sound welds using Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Cored Arc Welding (FCAW), and Gas Metal Arc Welding (GTAW) processes.

D. Describe American Welding Society (AWS) standards as well as industrial standards as they relate to welding.

E. Identify and solve common weldability problems.

F. Demonstrate the proper use and care of common welding equipment.

G. Identify weld defects, explain methods to prevent defects and demonstrate proper defect repair.

H. Read prints and interpret welding symbols.

I. Explain knowledge of basic material and welding metallurgy.

**Course Outcomes**

1. **Occupational Orientation**
   1. Prepares time or job cards, reports or records.
   2. Performs housekeeping duties.
   3. Follows verbal instructions to complete work assignments.
   4. Follows written instructions to complete work assignments.

2. **Safety and Health of Welders**
   1. Demonstrates proper use and inspection of Personal Protection Equipment (PPE).
   2. Demonstrates proper safe operation practices in the work area.
   3. Demonstrates proper use and inspection of ventilation equipment
   4. Demonstrates proper Hot Zone operation.
   5. Demonstrates proper work actions for working in confined spaces.
   6. Demonstrates proper use of precautionary labeling and MSDS information.
   7. Demonstrates proper inspection and operation of equipment used for each required welding and thermal cutting process.

3. **Drawing and Welding Symbol Interpretation**
   1. Interprets basic elements of a drawing or sketch.
   2. Interprets welding symbols information.
   3. Fabricates parts from a drawing or sketch.

4. **Shielded Metal Arc Welding (SMAW)**
   1. Performs safety inspections of SMAW equipment and accessories.
   2. Make minor external repairs to SMAW equipment and accessories.
   3. Sets up for SMAW operations on CS.
   4. Operates SMAW equipment on CS.
   5. Makes fillet welds in all positions on CS.
   6. Makes groove welds in all positions on CS.

5. **Gas Metal Arc Welding (GMAW-S, GMAW Spray Transfer)**
   1. Performs safety inspections of GMAW equipment and accessories.
   2. Make minor external repairs to GMAW equipment and accessories.
   3. Sets up for GMAW-S operations on CS.
   4. Operates GMAW-S equipment on CS.
   5. Makes fillet welds in all positions on CS.
   6. Makes groove welds in all positions on CS.
   7. Passes GMAW-S welder performance qualification test on CS.

   *Short Circuiting Transfer*
   8. Sets up for GMAW-S operations on CS.
   9. Operates GMAW-S equipment on CS.
   10. Makes fillet welds in the 1F and 2F positions on CS.
   11. Makes groove welds in the 1G position on CS.
12. Passes GMAW (spray) welder performance qualification test on CS.

6. Flux Cored Arc Welding (FCAW-G/GM, FCAW-S)
   1. Performs safety inspections of FCAW equipment and accessories.
   2. Make minor external repairs to FCAW equipment and accessories.
   Gas Shielded
   3. Sets up for FCAW-G/GM operations on CS.
   4. Operates FCAW-G/GM equipment on CS.
   5. Makes fillet welds in all positions on CS.
   6. Makes groove welds in all positions on CS.
   7. Passes FCAW-G/GM welder performance qualification test on CS.
   Self-Shielded
   8. Sets up for FCAW-S operations on CS.
   9. Operates FCAW-S equipment on CS.
   10. Makes fillet welds in all positions on CS.
   11. Makes groove welds in all positions on CS.
   12. Passes FCAW-S welder performance qualification test on CS.

7. Gas Tungsten Arc Welding (GTAW)
   1. Performs safety inspections of GTAW equipment and accessories.
   2. Makes minor external repairs to GTAW equipment and accessories.
   CS
   3. Sets up for GTAW operations on CS.
   4. Operates GTAW equipment on CS.
   5. Makes fillet welds in all positions on CS.
   6. Makes groove welds in all positions on CS.
   7. Passes GTAW welder performance qualification test on CS.
   Austenitic SS
   8. Sets up for GTAW operations on austenitic SS.
   9. Operates GTAW equipment on austenitic SS.
   10. Makes fillet welds in the 1F, 2F and 3F positions on austenitic SS.
   11. Makes groove welds in the 1G and 2G positions on austenitic SS.
   12. Passes GTAW welder performance qualification test on austenitic SS.
   Aluminum
   13. Sets up for GTAW operations on aluminum.
   14. Operates GTAW equipment on aluminum.
   15. Makes fillet welds in the 1F and 2F positions on aluminum.
   17. Passes GTAW welder performance qualification test on aluminum.

8. Thermal Cutting Processes
   Unit 1: Manual Oxyfuel Cutting (OFC)
   1. Performs safety inspections of manual OFC equipment and accessories.
   3. Sets up for manual OFC operations on CS.
   4. Operates manual OFC equipment on CS.
   5. Performs straight, square edge cutting in the flat and horizontal positions on CS.
   6. Performs shape, square edge cutting in the flat and horizontal positions on CS.
   7. Performs straight, bevel edge cutting in the flat and horizontal positions on CS.
   8. Performs scarfing & gouging to remove base & weld metal, in the flat & horizontal positions on CS.
   Unit 2: Mechanized Oxyfuel Cutting (OFC) (e.g., Track Burner)
   1. Performs safety inspections of mechanized OFC equipment and accessories.
   2. Makes minor external repairs to mechanized OFC equipment and accessories.
   3. Sets up for mechanized OFC operations on CS.
   4. Operates mechanized OFC equipment on CS.
   5. Performs straight, square edge cutting operations in the flat position on CS.
6. Performs straight, bevel edge cutting operations in the flat position on CS.
Unit 3: Manual Plasma Arc Cutting (PAC)
1. Performs safety inspections of manual PAC equipment and accessories.
5. Performs straight, square edge cutting in flat and horizontal positions on CS, SS & Alum.
6. Performs shape, square edge cutting in the flat and horizontal positions on CS, SS & Alum.
Unit 4: Manual Air Carbon Arc Cutting (CAC-A)
1. Performs safety inspections of manual CAC-A equipment and accessories.
3. Sets up for manual CAC-A scarfing and gouging operations on CS.
4. Operates manual CAC-A equipment on CS.
5. Perform scarfing & gouging operations to remove base and weld metal in the flat and horizontal positions on CS.

9. Welding Inspection and Testing
1. Examines cut surfaces and edges of prepared base metal parts.
2. Examines tacks, root passes, intermediate layers and completed welds

Textbooks
Provided by Instructor

Learner Supplies
Welding Kit provided by Bookstore or Baker's Gas & Ace Hardware
Welding Jacket with leather sleeves, cutting goggles, safety glasses, MIG gloves, workshop gloves, flint striker, and soapstone