



## COURSE OUTLINE: MET721 - WELDING

Prepared: Dave Holley

Approved: Corey Meunier, Chair, Technology and Skilled Trades

| <b>Course Code: Title</b>                                             | MET721: WELDING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                                          |                          |                                                         |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------------|--------------------------|---------------------------------------------------------|
| <b>Program Number: Name</b>                                           | 6231: STEAMFITTING INTERM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                                          |                          |                                                         |
| <b>Department:</b>                                                    | IRONWKR APPR./WELDING RELATED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                                          |                          |                                                         |
| <b>Semesters/Terms:</b>                                               | 19F, 20W, 20F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                                          |                          |                                                         |
| <b>Course Description:</b>                                            | This course provides apprentices with a combination of knowledge and practical skills in the operation and safe use of shielded metal arc welding equipment. Trade specific skills are developed through the preparation and welding of lap, tee and groove weld joints on steel plate and pipe in the flat and horizontal position. Safe work practices and weld quality are stressed throughout the course and are reinforced by means of an independent reading assignment complete with a final theory test.                      |                  |                                          |                          |                                                         |
| <b>Total Credits:</b>                                                 | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                  |                                          |                          |                                                         |
| <b>Hours/Week:</b>                                                    | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                  |                                          |                          |                                                         |
| <b>Total Hours:</b>                                                   | 24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                                          |                          |                                                         |
| <b>Prerequisites:</b>                                                 | MET621                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                          |                          |                                                         |
| <b>Corequisites:</b>                                                  | There are no co-requisites for this course.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                          |                          |                                                         |
| <b>Essential Employability Skills (EES) addressed in this course:</b> | EES 4    Apply a systematic approach to solve problems.<br>EES 5    Use a variety of thinking skills to anticipate and solve problems.<br>EES 10   Manage the use of time and other resources to complete projects.<br>EES 11   Take responsibility for ones own actions, decisions, and consequences.                                                                                                                                                                                                                                |                  |                                          |                          |                                                         |
| <b>Course Evaluation:</b>                                             | Passing Grade: 50%, D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                                          |                          |                                                         |
| <b>Other Course Evaluation &amp; Assessment Requirements:</b>         | 1. Re-writes are NOT allowed for any written assignment, quiz or test.<br>2. Repeats are NOT allowed for any shop test<br>3. Course attendance is mandatory. One percent (1 %) per hour will be deducted from the final course grade for apprentices with more than 4 hours of unexcused* absence.<br><br>[ Any absence without a written, valid reason will be deemed unexcused.]<br><br>Valid reasons would include:<br>Doctors note<br>Apprenticeship Ministry note<br>Family Death or Serious Illness supported by a written note |                  |                                          |                          |                                                         |
| <b>Books and Required Resources:</b>                                  | ILM Welding Bundle *J* (OXY/OXY/DIS) by Alberta ILM<br>Publisher: AK Graphics                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                                          |                          |                                                         |
| <b>Course Outcomes and Learning Objectives:</b>                       | <table><tr><th>Course Outcome 1</th><th>Learning Objectives for Course Outcome 1</th></tr><tr><td>This curriculum that has</td><td>1. Demonstrate by means of practical shop assignments a</td></tr></table>                                                                                                                                                                                                                                                                                                                          | Course Outcome 1 | Learning Objectives for Course Outcome 1 | This curriculum that has | 1. Demonstrate by means of practical shop assignments a |
| Course Outcome 1                                                      | Learning Objectives for Course Outcome 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  |                                          |                          |                                                         |
| This curriculum that has                                              | 1. Demonstrate by means of practical shop assignments a                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                  |                                          |                          |                                                         |



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been designed to provide apprentices with a sound working knowledge and level of skill in the safe use and operation of typical SMAW welding equipment. It's terminal objective will be to develop within the apprentice the skill required to produce welds capable of passing both visual and destructive testing .

sound working knowledge of both personal and shop safety.

Potential Elements of the Performance:

- identify proper eye, hand, and face protection
- identify proper footwear and clothing
- locate and identify shop ventilation devices
- locate and identify emergency fire exits
- identify the location of shut-off valves for the shop manifold gas system
- understand procedures for evacuation of shop areas in case of
- describe potential fire, fume and explosion hazards associated to the SMAW process

2. Demonstrate by means of practical shop assignments a sound working knowledge of how to set up and operate a typical SMAW workstation.

Potential Elements of the Performance:

- identify, select and adjust welding helmets and filter lenses
- identify electrode according to type, size and AWS / CSA numbering system
- identify ASME / CSA standards for the storage and handling of electrodes
- identify techniques for adjusting both welding current and polarity
- perform a routine inspection of assigned workstations to determine the condition of cables, electrode holder and related equipment
- correct deficiencies prior to the commencement of work
- explain basic of SMAW joint designs and base metal edge / surface preparation
- describe techniques for arc ignition, setting electrode angle and travel speed
- produce trial beads in the flat and horizontal positions
- identify possible weld defects and verify initial settings

3. Demonstrate by means of practical shop assignments a sound working knowledge of how to troubleshoot / correct defects.

Potential Elements of the Performance:

- perform adjustments to SMAW equipment specific to the demands of single and multi-pass fillet welds and groove welds
- describe and diagnose common weld defects
- take corrective action to eliminate the presence of weld defects
- perform destructive test on fillet welds to determine weld soundness
- identify and explain ASME and CSA acceptance standards for weld soundness
- identify and explain limited repair and service to electrode cables, holders, power sources and protective equipment

4. Demonstrate by means of practical shop assignments a sound working knowledge of how to pass visual examination



|                                               | <p>and destructive testing of weld samples.</p> <p>Potential Elements of the Performance:</p> <ul style="list-style-type: none"> <li>- describe the physical dimensions of a Vee-Groove test plate assembly including:</li> <li>- plate thickness, width and length</li> <li>- bevel angle</li> <li>- root opening</li> <li>- describe the acceptance criteria for the size and shape of the completed weld including:</li> <li>- number and size of bend test coupons</li> <li>- preparation and condition of bend coupons</li> <li>- identification of face vs root bend coupons</li> <li>- acceptance criteria for possible defects</li> </ul> |                 |                   |                  |     |             |     |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|------------------|-----|-------------|-----|
| <b>Evaluation Process and Grading System:</b> | <table> <tr> <th>Evaluation Type</th><th>Evaluation Weight</th></tr> <tr> <td>Shop Assingments</td><td>75%</td></tr> <tr> <td>Theory Test</td><td>25%</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Evaluation Type | Evaluation Weight | Shop Assingments | 75% | Theory Test | 25% |
| Evaluation Type                               | Evaluation Weight                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                   |                  |     |             |     |
| Shop Assingments                              | 75%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                   |                  |     |             |     |
| Theory Test                                   | 25%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                   |                  |     |             |     |
| <b>Date:</b>                                  | October 15, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                   |                  |     |             |     |
| <b>Addendum:</b>                              | Please refer to the course outline addendum on the Learning Management System for further information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |                   |                  |     |             |     |