MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
WELD 101 – Oxy-Fuel Welding, Cutting, and Plasma Cutting

Created by: Christopher Mayville

Updated by:

Canino School of Engineering Technology

Department: Mechanical & Energy Technology

Semester/Year: Spring 2021
A. **TITLE:** Oxy/Fuel Welding, Cutting, and Plasma Cutting

B. **COURSE NUMBER:** WELD 101

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

   - # Credit Hours: 3
   - # Lecture Hours: 1 per week
   - # Lab Hours: 4 per week
   - Other: per week

   **Course Length:** 15 Weeks

D. **WRITING INTENSIVE COURSE:** Yes [ ] No [x]

E. **GER CATEGORY:** None: [x] Yes: GER

   *If course satisfies more than one:* GER

F. **SEMESTER(S) OFFERED:** Fall [x] Spring [ ] Fall & Spring [ ]

G. **COURSE DESCRIPTION:**

   This course begins with compressed gas and general shop safety. Oxy-fuel cutting, welding, and brazing are covered along with plasma cutting. Additional cutting methods will be discussed, including more traditional saw cutting methods and laser cutting.

H. **PRE-REQUISITES:** None [x] Yes [ ] If yes, list below:

   **CO-REQUISITES:** None [x] Yes [ ] If yes, list below:
I. **STUDENT LEARNING OUTCOMES:** *(see key below)*

By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th><strong>Course Student Learning Outcome [SLO]</strong></th>
<th><strong>Program Student Learning Outcome [PSLO]</strong></th>
<th><strong>GER</strong> [If Applicable]</th>
<th><strong>ISLO &amp; SUBSETS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate the safe use of oxy-fuel cutting and welding equipment.</td>
<td>5</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
</tr>
<tr>
<td>Identify the proper selection and care of torch tips for oxy-fuel cutting and welding.</td>
<td>2</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
</tr>
<tr>
<td>Use proper procedures to complete quality cuts using oxy-fuel and plasma cutting methods.</td>
<td>3</td>
<td>4-Soc Respons ISLO ISLO</td>
<td>ER Subsets Subsets Subsets</td>
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<tr>
<td>Identify adjustments necessary to create the desired weld flame characteristics.</td>
<td>2</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
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<tr>
<td>Demonstrate proper technique for welding outside corner, butt, lap, and tee joints in the flat and vertical positions, as well as pipe welds.</td>
<td>4</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<tr>
<td>Perform brazing operations on butt, tee, and lap joints with the same thickness of material and joints connecting thin metal to thicker metal.</td>
<td>4</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
</tr>
<tr>
<td>Successfully braze weld butt joints, tee joints, and perform surface build-up</td>
<td>4</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<tr>
<td>Correctly solder tee joints, lap joints, and copper pipe.</td>
<td>4</td>
<td>5-Ind, Prof, Disc, Know Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<tr>
<td>KEY</td>
<td>Institutional Student Learning Outcomes [ISLO 1 – 5]</td>
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<tr>
<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
<td></td>
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</tbody>
</table>
| 1 | Communication Skills  
Oral [O], Written [W] |
| 2 | Critical Thinking  
Critical Analysis [CA], Inquiry & Analysis [IA], Problem Solving [PS] |
| 3 | Foundational Skills  
Information Management [IM], Quantitative Lit./Reasoning [QTR] |
| 4 | Social Responsibility  
Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T] |
| 5 | Industry, Professional, Discipline Specific Knowledge and Skills |

*Include program objectives if applicable. Please consult with Program Coordinator*
J. **APPLIED LEARNING COMPONENT:** Yes ☒ No ☐

If YES, select one or more of the following categories:

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship (program, class, project)

K. **TEXTS:**


L. **REFERENCES:**

None

M. **EQUIPMENT:** None ☐ Needed: Typical equipment for oxy-fuel welding and cutting, brazing, soldering, and plasma cutting, as well as metal cutting saws and grinders.

N. **GRADING METHOD:** A-F

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

Homework, quizzes, tests, lab exercises, and hands on practical exams

P. **DETAILED COURSE OUTLINE:**

1. Introduction to Welding
   - Define Welding
   - Welding and Cutting Processes
   - Training and Occupations

2. Welding Safety
   - Burn Classifications
   - Fire Protection
   - Light Hazards
   - Personal Protection Equipment (PPE)
   - Respirators and Ventilation
   - Safety Data Sheets (SDS)
   - Gas Cylinder Handling
   - General Shop Safety

3. Flame Cutting
   - Cylinder, regulator, and torch construction and operation
   - Fittings, hoses, reverse flow devices, and flashback devices
   - Torch tip sizing, selection, and care
Layout, setup, and cutting procedures

4. Plasma Arc Cutting
   - History and theory of operation
   - Torch construction and consumables
   - Plasma gases
   - Layout, setup, and cutting procedures

5. Gouging
   - Oxy-fuel
   - Plasma Arc
   - Air Carbon Arc

6. Other cutting processes
   - LaserBeam Cutting and Drilling
   - Water Jet
   - Band Saws
   - Cold Cut Circular Saws
   - Grinding and Abrasive Cutting

7. Oxy/fuel Welding
   - Torch construction and operation
   - Torch tip sizing, selection, and care
   - Flame Characteristics
     - Fuels and combustion
   - Weld Characteristics
   - Filler Metals
   - Weld Joints
   - Weld Positions

8. Brazing, Braze Welding, and Soldering
   - Capillary action
   - Flux
   - Methods
     - Torch
     - Furnace
     - Induction
     - Resistance

Q. LABORATORY OUTLINE: None ☐ Yes ☒

1. Laboratory and Compressed Gas Safety
2. Oxy-fuel Torch Setup and Operation
3. Oxy-fuel Cutting
   - Straight
   - Circle
   - Bevel
   - Off hand techniques
   - Positions
     - Horizontal
     - Vertical
     - Overhead
   - Pipe
     - Small diameter
     - Large diameter
4. Plasma Cutting
   Machine set-up
   Cuts
   Straight
   Piercing
   Circle
   Bevel
   Pipe
   Machine cutting
5. Gouging
   Oxy-fuel
   Plasma
6. Mechanical Cutting
   Bandsaw
   Horizontal
   Vertical
   Chop saw and grinder cut-off wheel
   Cold cut saw
7. Oxy-fuel Welding
   Run a puddle without filler rod
   Weld with filler rod
   Joints
   Outside corner
   Butt
   Lap
   Tee
   Positions
   Flat
   Vertical
   Pipe welds
8. Brazing, Braze Welding, and Soldering
   Braze joints
   Butt
   Tee
   Lap
   Thin to thick metal
   Braze weld
   Butt joint
   Tee joint
   Surface buildup
   Soldering
   Tee joint
   Lap joint
   Copper pipe
   Vertical up
   Horizontal
   Vertical up