STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

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

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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 ☒

E. **GER CATEGORY: None:** ☒ **Yes:** GER
***If course satisfies more than one*:** GER

F. **SEMESTER(S) OFFERED: Fall** ☒ **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** ☒ **Yes** ☐ **If yes, list below:**

CO-REQUISITES: None ☒ **Yes** ☐ **If yes, list below:**

I. STUDENT LEARNING OUTCOMES: (*see key below*)

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

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER** [If Applicable]*	***ISLO & SUBSETS***	
Demonstrate the safe use of oxy-fuel cutting and welding equipment.	5		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Identify the proper selection and care of torch tips for oxy-fuel cutting and welding.	2		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Use proper procedures to complete quality cuts using oxy-fuel and plasma cutting methods.	3		4-Soc Respons ISLO ISLO	ER Subsets Subsets Subsets
Identify adjustments necessary to create the desired weld flame characteristics.	2		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Demonstrate proper technique for welding outside corner, butt, lap, and tee joints in the flat and vertical positions, as well as pipe welds.	4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Perform brazing operations on butt, tee, and lap joints with the same thickness of material and joints connecting thin metal to thicker metal.	4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Successfully braze weld butt joints, tee joints, and perform surface build-up	4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Correctly solder tee joints, lap joints, and copper pipe.	4		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
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:

Jeffus, Larry. (2017). Welding: Principles and Applications, 8th Edition. Boston, MA: Cengage Learning.

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. <u>LABORATORY OUTLINE</u>: 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**