



**COURSE OUTLINE : WELD 121**  
**D Credit – Degree Applicable**  
**COURSE ID 001547**  
**Cyclical Review: September 2020**

**COURSE DISCIPLINE :** WELD  
**COURSE NUMBER :** 121  
**COURSE TITLE (FULL) :** Occupational Welding I  
**COURSE TITLE (SHORT) :** Occupational Welding I  
**ACADEMIC SENATE DISCIPLINE:** Welding

**CATALOG DESCRIPTION**

WELD 121 is the first in a series of occupational welding courses designed to prepare the student for employment in the welding industry. It covers the theory of welding processes, welding safety, terms, basic metallurgy, and the fundamentals of shielded metal arc welding (SMAW) and oxyacetylene welding.

Total Lecture Units: 1.00

Total Laboratory Units: 2.00

**Total Course Units: 3.00**

Total Lecture Hours: 18.00

Total Laboratory Hours: 108.00

Total Laboratory Hours To Be Arranged: 0.00

**Total Contact Hours: 126.00**

**Total Out-of-Class Hours: 36.00**

Recommended Preparation: ENGL 100 or ESL 141, or equivalent.



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**ENTRY STANDARDS**

	Subject	Number	Title	Description	Include
1	ENGL	100	Writing Workshop	Read, analyze, and evaluate contemporary articles and stories to identify topic, thesis, support, transitions, conclusion, audience, and tone;	Yes
2	ENGL	100	Writing Workshop	read, analyze, and evaluate contemporary articles and stories for the comprehension of difficult content and the identification of main ideas and (topic-based) evidence;	Yes
3	ENGL	100	Writing Workshop	write a summary of a contemporary article or story with correct citation techniques;	Yes
4	ESL	141	Grammar and Writing IV	Compose a 400 to 450-word thesis-based essay which:  (a) summarizes and cites appropriately a reading passage provided as a prompt,  (b) includes a clear thesis statement,  (c) uses evidence to support the thesis,  (d) shows clear organization into an introduction, body, and conclusion, and  (e) uses appropriate rhetorical modes such as comparison/contrast, cause/effect, and persuasion in order to support a thesis.	Yes

**EXIT STANDARDS**

- 1 Perform manipulative skills in oxy-fuel welding, cutting, brazing, and shielded metal arc welding, and plasma arc cutting;
- 2 demonstrate a working knowledge of oxy-fuel, welding and cutting equipment, shielded metal arc welding equipment, plasma arc cutting equipment and their theories;
- 3 critique and evaluate weldments after properly performing a series of destructive tests on the samples;
- 4 demonstrate proper safety precautions in the use of oil oxy-fuel and shielded metal arc welding equipment;
- 5 write and compile a general welding notebook to be used as a reference guide for related classes;
- 6 show a general knowledge of basic metallurgy, welding terms and metal identification.



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**STUDENT LEARNING OUTCOMES**

- 1 demonstrate and use practical knowledge of working safely with others using personal protective equipment;
- 2 demonstrate a working knowledge of oxy-fuel welding and cutting;
- 3 perform multiple welding techniques in oxy-fuel and ARC/MIG processes using class exercises for completion.

**COURSE CONTENT WITH INSTRUCTIONAL HOURS**

	Description	Lecture	Lab	Total Hours
1	Methods of Welding	2	0	2
2	Welding Terms	2	0	2
3	Basic Welding Design and Application <ul style="list-style-type: none"> <li>• Welding joints</li> <li>• Applications</li> </ul>	2	0	2
4	Common Metals Identification <ul style="list-style-type: none"> <li>• Identifying procedures</li> <li>• testing metals</li> </ul>	6	0	6
5	Basic Metallurgy <ul style="list-style-type: none"> <li>• Physical properties of metals</li> <li>• Annealing and stress relief</li> <li>• Tempering</li> <li>• Work hardening</li> <li>• Effects of alloying</li> <li>• Classification of steels</li> <li>• Classification of aluminum</li> </ul>	4	0	4
6	Welding Safety <ul style="list-style-type: none"> <li>• Hazards</li> <li>• Clothing and equipment</li> </ul>	2	0	2



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7	<p>Oxyacetylene Welding and Brazing</p> <p>O/A safety in setting up equipment</p> <p>O/A definitions and procedures</p> <p>Flame types and uses</p> <p>Regulators, torch maintenance</p> <p>Welding rods: types, alloys</p> <p>Common defects: inclusions, blowholes, porosity</p> <p>Flat position welding:</p> <ul style="list-style-type: none"> <li>• Running a puddle bead</li> <li>• Welding edge and cover joints on 16 ga. Material</li> <li>• Running a bead with a filler rod</li> <li>• Butt, tee and lap joints using a filler rod</li> </ul> <p>Vertical position welding of butt, tee, and lap joints on 16 ga. Material</p> <p>Brazing:</p> <ul style="list-style-type: none"> <li>• Preparing the base metal</li> <li>• Laying a bronze bead on plate</li> <li>• Brazing a butt, tee, and lap joints</li> </ul>	0	30	30
8	<p>Oxyacetylene Cutting Theory and Practice</p> <ul style="list-style-type: none"> <li>• Setting up equipment for manual and automatic flame cutting</li> <li>• Manual flame cutting</li> <li>• Automatic flame cutting</li> </ul>	0	4	4



9	<p>Metallic Arc Welding</p> <p>Definitions and classification of arch welding</p> <p>Safety hazards</p> <p>Machines and accessories</p> <ul style="list-style-type: none"> <li>• Transformers</li> <li>• Rectifiers</li> <li>• Transformer/Rectifier</li> </ul> <p>Electrode selection</p> <ul style="list-style-type: none"> <li>• A.W.S. classification code</li> <li>• Characteristics of electrodes</li> <li>• Identification and N.E.M.A. color code</li> </ul> <p>Selection of polarity of current</p> <ul style="list-style-type: none"> <li>• AC</li> <li>• DC positive or negative</li> </ul> <p>Problems encountered</p> <ul style="list-style-type: none"> <li>• Arc blow</li> <li>• Inclusions</li> <li>• Porosity</li> <li>• Gas pockets</li> <li>• Cracking</li> </ul> <p>Preparation of work</p> <ul style="list-style-type: none"> <li>• Joint design</li> <li>• Types of joints</li> <li>• Welding positions</li> </ul>	0	60	60
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10	<p>Arc Welding in Various Positions</p> <ul style="list-style-type: none"> <li>• Using electrodes E6010, E6013, E7018, E7024</li> <li>• Striking an arc</li> <li>• Running a bead on flat plate</li> <li>• Building up a pad</li> <li>• Butt, fillet, vee groove welding</li> <li>• Guided band testing, tensile testing, cutting coupons</li> </ul>	0	14	14
				<b>126</b>

**OUT OF CLASS ASSIGNMENTS**

- 1 write an essay describing the process used to complete the final project;
- 2 final project (welding beads using oxygen acetylene welding);
- 3 homework written assignments.

**METHODS OF EVALUATION**

- 1 quizzes;
- 2 examination at the end of each instructional mode;
- 3 final examination;
- 4 final project (e.g. flat butt fusion weld with filler rod using oxygen acetylene welding).

**METHODS OF INSTRUCTION**

- Lecture
- Laboratory
- Studio
- Discussion
- Multimedia
- Tutorial
- Independent Study
- Collaboratory Learning
- Demonstration
- Field Activities (Trips)
- Guest Speakers
- Presentations



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**TEXTBOOKS**

<b>Title</b>	<b>Type</b>	<b>Publisher</b>	<b>Edition</b>	<b>Medium</b>	<b>Author</b>	<b>ISBN</b>	<b>Date</b>
Welding Fundamentals	Required	Goodheart-Willcox	5	print	Bowditch, William A.	978-1-63126-328-6	2017