LAKELAND COMMUNITY COLLEGE – COURSE OUTLINE FORM

*** APPROVED VERSION, EFFECTIVE Fall/ 18

ORIGINATION DATE:	12/1/15	**APPROVAL DATE:**	12/5/18
LAST MODIFICATION DATE:	1/30/18	**EFFECTIVE TERM/YEAR:**	FALL/ 18
		PRINTED:	8/6/2018

COURSE ID: **WELD1030**

COURSE TITLE: Arc Welding Fundamentals

	LECTURE	**LAB**	**CLINICAL**	**TOTAL**	**OBR MIN**	**OBR MAX**
CREDITS:	3.00	0.00	0.00	3.00	3.00	3.00
CONTACT HOURS:	3.00	0.00	0.00	3.00		

PREREQUISITE:

COURSE DESCRIPTION:

This course provides an overview of the basic knowledge and skills related to welding. It does not provide hands-on welding experience. Topics include blueprint reading and sketching, machining, metalworking principles and techniques, basic metallurgy, and fixturing. It also presents basic concepts of electricity and how this relates to welding. A calculator capable of calculating the square root of a number is required.

RATIONALE FOR COURSE:

Knowledge of welding principles, equipment and terminology is necessary for the successful welder. The most critical skills related to welding are presented in this course.

OUTCOMES:

The course will

1. Discuss concepts of metallurgy.
2. Provide a basic understanding of electricity, and how it relates to arc welding.
3. Introduce students to Lakeland's Industrial Welding degree program and its requirements.
4. Provide students with an introduction to industry standard welding certifications and requirements.
5. Introduce students to the economics of welding.
6. Present safety practices in welding.
7. Discuss welding terminology and definitions.
8. Introduce students to the parts and components of welders.
9. Discuss basic testing and inspection of welds.

PERFORMANCE INDICATORS:

Upon completion of the course, the student should be able to

1. Discuss basic principles of arc welding.

2. Interpret welding drawings and symbols.

3. Discuss concepts of metallurgy.

4. Discuss basic concepts of electricity in welding and related equipment.

5. Discuss the requirements of a weld.

6. Discuss the economics of welding.

7. Discuss safety in welding.

8. Discuss opportunities for welding career preparation including Lakeland's Industrial Welding degree and industry standard welding certifications.

COURSE OUTLINE:

I. Introduction to Welding
   - A. Explanation of what welding is and career pathways
   - B. Familiarization with basic welding terminology
   - C. Types of welds, joints and positions of welding
   - D. Welding Tools and Equipment

II. Basic Principles of Arc welding
   - A. Introduction to electricity as it relates to welding
   - B. Commonly-used arc welding processes (SMAW, GMAW,FCAW,GTAW,SAW)
   - C. Types of power sources
   - D. Welding electrodes and filler rods
   - E. The eight critical welding variables associated with arc welding
   - F. Commonly-encountered problems and how to address them

III. Requirements of welds
   - A. What the requirements are and how they are specified
   - B. Use of measuring devices to verify weld locations and size
   - C. Types of defects in welds and base metals
   - D. Testing and inspection of welds and base materials
   - E. Calculating required quantity of electrode or filler rod
   - F. Converting metric dimensions to US customary units
   - G. Understanding welding symbols
   - H. Understanding and working to code and specification requirements including Welding Procedure specifications, records, and documents.

IV. Basic welding metallurgy and properties of metals
   - A. Commonly-welded metals
   - B. Properties of metals and methods used to change them
   - C. How welding impacts the properties of metals
   - D. How to avoid cracking of welds and base metals

V. Economics of welding
   - A. The 5 steps to economical welding
   - B. Calculating weld weights, deposition rates, arc times, and operating factors
   - C. The importance of "doing it right the first time"

D. Building and using fixtures and positioners to save time

VI. Weld safety and health
A. Electrical hazards
B. Arc radiation
C. Fires and burns
D. Safe use of torches and handling of compressed gas cylinders
E. dangers of oxygen and other gases used in welding and cutting
F. Welding on tanks and closed containers
G. Confined spaces
H. Fall protection
I. Using hand-held grinders

INSTRUCTIONAL PROCEDURES THAT MAY BE UTILIZED:

Instruction delivery will be through lecture, demonstration, and visual media as appropriate.

GRADING PROCEDURES:

Tests 30%
Quizzes 20%
Assignments 20%
Comprehensive Final 30%

COURSE EVALUATION PROCEDURES:
This course will be reviewed biennially by the department chair.
Each class will be evaluated by student evaluations.

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LAKELAND STUDENT LEARNING OUTCOMES

		I	R	D
	LEARNS ACTIVELY			
1.	Takes responsibility for his/her own learning.			
2.	Uses effective learning strategies.			
3.	Reflects on effectiveness of his/her own learning strategies.			
	THINKS CRITICALLY	**I**	**R**	**D**
4.	Identifies an issue or idea.			
5.	Explores perspectives relevant to an issue or idea.			
6a.	Identifies options or positions.	I		
6b.	Critiques options or positions.	I		
7.	Selects an option or position.			
8a.	Implements a selected option or position.			
8b.	Reflects on a selected option or position.			
	COMMUNICATES CLEARLY	**I**	**R**	**D**
9a.	Uses correct spoken English.			
9b.	Uses correct written English.			
10.	Conveys a clear purpose.			
11.	Presents ideas logically.			
12a.	Comprehends the appropriate form(s) of expression.	I		
12b.	Uses the appropriate form(s) of expression.	I		
13.	Engages in an exchange of ideas.			
	USES INFORMATION EFFECTIVELY	**I**	**R**	**D**
14.	Develops an effective search strategy.			
15a.	Uses technology to access information.			
15b.	Uses technology to manage information.			
16.	Uses selection criteria to choose appropriate information.			
17.	Uses information responsibly.			
	INTERACTS IN DIVERSE ENVIRONMENTS	**I**	**R**	**D**
18a.	Demonstrates knowledge of diverse ideas.			
18b.	Demonstrates knowledge of diverse values.			
19.	Describes ways in which issues are embedded in relevant contexts.			
20a.	Collaborates with others.			
20b.	Collaborates with others in a variety of situations.			
21.	Acts with respect for others.			

Definitions:

Introduces (I)

Students first learn about key ideas, concepts, or skills related to the performance indicator. This usually happens at a general or very basic level, such as learning one idea or concept related to the broader outcome.

Reinforces (R)

Students are given the opportunity to synthesize key ideas of skills related to the performance indicator at increasingly proficient levels.

Demonstrates (D)

Students should demonstrate mastery of the performance indicator with the level of independence expected of a student attaining an associate's degree.