

# BUTTE COLLEGE

## COURSE OUTLINE

### I. CATALOG DESCRIPTION

#### **WLD 42 - Introduction to Welding Inspection**

**2 Unit(s)**

**Prerequisite(s):** WLD 22, WLD 24, WLD 25, WLD 26, WLD 40, WLD 50, WLD 154 and NCCER Level II Welding Qualification

**Co-requisite(s):** WLD 28, WLD 30, WLD 32, WLD 34, WLD 36, WLD 56, WLD 156

**Recommended Prep:** NONE

**Transfer Status:** CSU

34 hours Lecture

This course instructs on the qualifications and knowledge requirements of a Certified Welding Inspector (CWI). Methods of testing, various procedures, and techniques of inspection. familiarize students with the basic concepts of destructive and nondestructive evaluation processes. Emphasis of record keeping methods used by the American Welding Society (AWS), American Society of Mechanical Engineers (ASME), American Petroleum Institute (API), and American National Standards Institute (ANSI).

### II. OBJECTIVES

Upon successful completion of this course, the student will be able to:

- A. Apply testing symbols to weldments according various welding standards.
- B. Apply codes to weldments that are currently used in the welding industry.
- C. Describe the role of a CWI in fabrication and the qualification of a welder.

### III. COURSE CONTENT

#### **A. Unit Titles/Suggested Time Schedule**

Lecture	
<u>Topics</u>	<u>Hours</u>
1. Introduction and safety	1.00
2. Application and scope	0.50
3. Definitions	1.50
a. Definitions of welding terms	
b. Master chart of welding, allied processes & thermal cutting	
4. Symbols	2.00
a. Nondestructive testing symbols	
b. Basic testing symbols	
5. Ethical and essential requirements for a CWI	2.00
a. Ethical requirements	
b. Essential requirements	
c. Knowledge of testing methods	
d. Welding experience	

6. Welding inspection operations	2.00
a. Knowledge of drawings, specifications, manufacturing instructions	
b. Welding procedure and welder qualifications	
c. Application of welding and allied procedures	
7. Quality assurance	1.00
a. Organization requirements	
b. Welding procedures and qualification records	
8. Welding metallurgy	3.00
a. Mild carbon steel	
b. Hydrogen and steel	
c. Low alloy steels	
d. Austenitic stainless steel	
e. Laminations and lamellar tearing	
9. Preheating and postweld heat treating	1.00
a. Preheating	
b. Postweld heat treating	
10. Weld and weld-related discontinuities	3.00
a. Dimensional discontinuities	
b. Weldment and related discontinuities	
c. Mechanical and chemical weld metal	
d. Glossary of weld discontinuities	
11. Welding procedure specifications	2.00
a. Description and important details	
b. Examples of welding procedure specifications	
12. Qualification of welding procedure specifications	1.00
a. Description	
13. Qualification of welders and welding operations	1.50
a. Performance qualification requirements	
b. The test specimen	
c. Testing of qualification welds	
d. Qualification records	
e. Standardization of tests	
f. Retests	
14. Selection of samples of welding tests	1.00
a. Procedural sampling methods	
b. Control charts for attributes	

15. Destructive testing of welds	1.50
a. Chemical tests	
b. Corrosion tests	
c. Metallographic tests	
d. Hardness stress	
e. Mechanical tests	
f. Standard tension test	
g. Tests of welded joints	
h. Notched-bar impact tests	
16. Proof and leak tests	1.00
a. Proof tests	
b. Leak tests	
17. Nondestructive testing	3.00
a. Inspection by visual testing	
b. Inspection by radiographic testing	
c. Ultrasonic testing of welds and weld related materials	
d. Magnetic particle testing	
e. Penetrant testing	
f. Eddy current (electromagnetic) testing	
g. Acoustic emission testing	
h. Ferrite testing	
i. Nondestructive testing procedures	
18. Qualification of nondestructive testing personnel	2.00
19. Codes and standards	3.00
20. Metric practice	1.00
a. The SI system	
b. Units	
c. Commonly used metric conversions	
Total Hours	34.00

#### IV. **METHODS OF INSTRUCTION**

- A. Instructor Demonstrations
- B. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- C. Discussion
- D. Demonstrations
- E. Multimedia Presentations
- F. Student application

#### V. **METHODS OF EVALUATION**

- A. Exams/Tests
- B. Quizzes
- C. Homework
- D. Assignments

## **VI. EXAMPLES OF ASSIGNMENTS**

### **A. Reading Assignments**

1. Read chapter 1 and be prepared to discuss in class.
2. Read assigned AWS journal article and be prepared to discuss in class.

### **B. Writing Assignments**

1. Describe an order of operations for the assigned destructive testing (DT) method of an SVOG pipe welding joint.
2. Write an essay explaining how the assigned AWS article can be implemented into the process and how it relates to the class.

### **C. Out-of-Class Assignments**

1. Define assigned vocabulary words and also explain how to prevent these weld defects from occurring.
2. Research the proper process for setting up nondestructive testing (NDT) equipment using an AWS publication.

## **VII. RECOMMENDED MATERIALS OF INSTRUCTION**

### **Textbooks:**

- A. AWS Committee on Methods of Inspection. Welding Inspection. 3 Edition. -, 2000.
- B. National Center for Construction Education and Research (NCCER). Welding Level Three. 4th Edition. Pearson Education INC, 2010.
- C. National Center for Construction Education and Research (NCCER). Welding Level Two. 4th Edition. Pearson Education INC, 2010.

### **Materials Other Than Textbooks:**

- A. All tools listed in the Butte College Welding Technology Program Guide.

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**Date:** 04/18/2011