SOUTHEAST COMMUNITY COLLEGE
TRANSPORTATION OCCUPATIONS
WELDING TECHNOLOGY
COURSE SYLLABUS
January 23, 2023

I. CATALOG DESCRIPTION

Course Number: WELD1294
Course Title: Mechanical Air Brake Pipe Welding
Prerequisite: Approval of BNSF Training Director

Catalog Description: Upon successful completion of this course, the student should be qualified to weld with FCAW and SMAW according to AWS D15.1 code. All pipe welding will be done in the horizontal (2F & 2G), and in the horizontal fixed position (5F & 5F). Passing or failing will be determined by the student's ability to successfully produce welds according to prescribed standards in AWS D15.1.

Credit Hours: 3
Classroom Hours: 30
Lab Hours: 50
Total Contact Hours: 80

II. COURSE OBJECTIVES: *Course will cover:*

A. Arc Welding (FCAW) ESAB Dual Shield 7100 Ultra (.035")

1. Horizontal pad on scrap material
2. Horizontal fillet (2F) on 2" pipe to plate; use 1/4" x 4" x 4" scrap metal (5/16" leg)
3. A pad on 2" pipe in the vertical fixed position
4. 2F socket welds (1 ¼" socket)
5. 2G pipe v-groove with backing ring; use a 1/8" root opening on 2" schedule 80 carbon steel pipe (face and root bend required)
6. 5F on 2" pipe to plate: Use 1/4" x 4" x 4" scrap metal (5/16" leg)
7. A pad on 2" pipe in the horizontal fixed position
8. 5F uphill socket welds (1 ¼" socket)
9. 5G uphill pipe v-groove with backing ring; Use a 1/8" root opening on 2" schedule 80 carbon steel pipe (face and root bends required)

B. Arc Welding (SMAW) with 3/32" E7018

1. Horizontal pad on scrap material
2. Horizontal fillet (2F) on 2" pipe to plate; use 1/4" x 4" x 4" scrap metal (5/16" leg)
3. A pad on 2" pipe in the vertical fixed position
4. 2F socket welds (1 ¼" sockets)
5. 2G pipe v-groove with backing ring: Use a 1/8" root opening on 2" schedule 80 carbon steel pipe (face and root bend required)
6. 5F on 2" pipe to plate: Use 1/4" x 4" x 4" scrap metal (5/16" leg)
7. A pad on 2" pipe in the horizontal fixed position
8. 5F uphill socket welds (1 ¼" socket)
9. 5G uphill pipe v-groove with backing ring; Use a 1/8" root opening on 2" schedule

80 carbon steel pipe (face and root bends required)

C. Final Weld Tests

1. AWS D15.1 Code test

D. AWS D15.1 Welder Qualification

1. Weld profiles
   a. Groove welds

E. Test Results Required

1. Visual inspection
2. Root-, face- and side-bend tests

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

A. STUDENT LEARNING OUTCOMES: *Student will be able to:*

1. Identify and practice appropriate shop safety rules.
2. Identify the basic welding joints and welding positions.
3. Explain the basic theory of how the FCAW and SMAW process works.
4. Select proper electrodes and welding procedures according to the steel being welded.
5. Demonstrate an understanding of the AWS D15.1 code, as it pertains to qualification testing for 2" schedule 80 pipe welds in the 2G, and 5G positions, using FCAW and SMAW.
6. Demonstrate an understanding of the AWS D15.1 weld inspection requirements and how to utilize weld inspection gages.
7. Perform lab competencies as assigned.
8. Demonstrate proper techniques in preparing test coupons.

B. GENERAL EDUCATION LEARNING OUTCOMES:

IV. CONTENT/TOPICAL OUTLINE

V. INSTRUCTIONAL MATERIALS

Required Text(s): Provided by BNSF
Required Class Material(s): Provided by BNSF

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:

VII. METHODS OF EVALUATION OF COMPETENCIES

Evaluation of student mastery of course competencies will be accomplished using the following methods. Lab competencies will be assigned a level of 0-100. All students must pass all bend tests in order to be assured of at least a "C" letter grade. Also, all bend tests must pass in order to receive certification papers.

Lab Projects	10%	100-95%	A

2G FCAW Code Test	15%	94-90%	B
5G FCAW Code Test	15%	89-80%	C BNSF Min.
2G SMAW Code Test	15%	79-70%	D
5G SMAW Code Test	20%	69% & Less	F
Classroom/Lab Participation	10%		
Midterm Test	5%		
Written Final	10%		
	100%		

VIII. SPECIFIC COURSE REQUIREMENTS

A. BNSF requires the student to have a minimum grade of 80%.

B. Attendance:

1. Attendance each of the 10 days of class is very important as it is difficult to make up lost time or incomplete projects.
2. Unexcused absence(s) will result in a grade reduction of one letter grade.

C. Late work and makeup policy:

1. Failure to complete lab projects will result in a zero (0) on the project when the final grade is calculated.

D. Safety:

1. **BNSF Employee Safety Rules will be followed. *** While attending training, BNSF employees are considered "ON DUTY" and must comply with BNSF safety rules.**
2. Safety glasses with side shields must be worn during lab activities associated with this course.
3. In addition, all students need to strictly follow the BNSF rules regarding the proper use of personal protection equipment. The first violation will result in a verbal warning, the second will result in a grade reduction of 5%, and a third will result in a letter grade reduction and will be counseled by the BNSF Manager of Training which may result in dismissal from the class.

E. Weapons:

While on duty or on railroad property, employees must not have firearms or other deadly weapons, including knives with a blade longer than 3 inches.