



**COWLEY COLLEGE  
& Area Vocational Technical School**

**COURSE PROCEDURE FOR**

**SPECIAL ALLOY WELDING/INSPECTION  
WEL3644 6 Credit Hours**

**Student Level:**

This course is open to students on the college level in either the freshman or sophomore year and to area high school vocational students.

**Catalog Description:**

**WEL3644 - SPECIAL ALLOY WELDING/INSPECTION (6 hrs)**

Upon completion of this course a student will be able to successfully produce documentation of test specimens and compare that information to codes and standards to determine component usability. Students are expected to become proficient in the identification of various common alloys and apply precautions in selecting correct filler metals for welding. Students will be introduced to automated shape cutting and become familiar with working with images, designing shapes and dimensioning, editing cut paths and cutting parts using plasma arc cutting equipment.

**Prerequisites:**

None

**Controlling Purpose:**

This course is designed to allow students to apply their knowledge and skills in welding of special alloys such as aluminum, magnesium and titanium.

**Learner Outcomes:**

Students in this course will be expected to pass qualification procedures in pipe welding using the Gas Tungsten Arc Welding process. Welds made in various positions will be subject to guided bend test and x-ray examination to detect flaws.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

**Units Outcomes and Criterion Based Evaluation Key for Core Content:**

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

**UNIT 1: Alloy Identification**

Outcomes: Upon completion of this unit, the student will be able to successfully identify various special alloys and their weldability.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify special alloys by means of spark test.
						Analyze the base metal elements and determine its weldability.

**UNIT 2: Precautions In Alloy Welding**

Outcomes: Upon completion of this unit, the student will be able to successfully demonstrate safe practices concerning the welding of special alloys.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Prepare a list of precautions concerning the welding of special alloys.
						Prescribe a plan to safely weld in special alloys.

**UNIT 3: Evaluation Of Filler Metal Requirements For Special Alloys**

Outcomes: Upon completion of this unit, the student will be able to successfully determine the filler metal requirements of various special alloys.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify a special alloy, compile a list of filler metals that may be used to weld a particular metal.
						Specify the procedures involved in determining the correct filler metals.

**UNIT 4: Process Evaluation**

Outcomes: Upon completion of this unit, the student will be able to successfully evaluate the process requirement for the special alloys.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Determine the weldability of special alloys.
						Indicate the possible correct procedures for welding special alloys including stainless steel, aluminum, titanium, and nickel based materials.

**UNIT 5: Welding Special Alloys**

Outcomes: Upon completion of this unit, the student will be able to successfully produce sound welds on special alloys.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Prepare specimens of special alloys for welding.
						Demonstrate the correct procedures for the welding of special alloys.

**UNIT 6: Welding Inspection**

Outcomes: Upon completion of this unit, the student will be able to successfully examine and determine the soundness of welds.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Associate a list of criteria for determining the soundness of welds.
						Associate the methods of inspection to industry or service requirements.
						Prepare specimens for destructive testing.
						Prepare specimens for nondestructive testing.
						Compare methods and requirements of inspection to actual specimens tested.

**UNIT 7: Shape Cutting Processes**

Outcomes: Upon completion of this unit, the student will be able to successfully identify methods and equipment used for automated shape cutting in industry.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify various processes used in industry for shape cutting.
						Analyze process requirements for a variety of base materials.

**UNIT 8: Plasma CAM Function And Safety**

Outcomes: Upon completion of this unit, the student will be able to successfully identify functions and components of the Plasma Cam and follow safety precautions.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify safety precautions for cutting tables.
						Identify safety precautions for plasma cutters.

**UNIT 9: Plasma CAM Layout Of Shapes**

Outcomes: Upon completion of this unit, the student will be able to successfully generate shapes and use drawing commands to produce simple images and text.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Generate line shapes using the operating program.
						Facilitate the use of draw commands to make fillets, bulges, arcs, circles, and rectangles.
						Facilitate the use of edit commands to make adjustments in scaled size, mirrored images, scaled height, and rotated images.

**UNIT 10: Plasma CAM Importing Images**

Outcomes: Upon completion of this unit, the student will be able to successfully import images from several media types and convert them to cut paths.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Convert JPG images to bitmap format files.
						Convert color images to black and white or negative hues.
						Import images in operating program and convert to cut paths.
						Import AutoCad DXF files and create cut paths.
						Analyze, cut, preview, and edit cut paths.

## UNIT 11: Cutting Shapes With The Plasma CAM

Outcomes: Upon completion of this unit, the student will be able to successfully cut usable shapes and parts from carbon steel, stainless steel, and aluminum.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Differentiate the use of various consumable electrode and cutting tips for plasma cutters.
						Analyze cutting speeds and amperage requirements for various thicknesses of carbon steel, stainless steel, and aluminum.
						Select cut paths from files and produce usable shape and parts.

### **Projects Required:**

As assigned.

### **Textbook:**

Contact Bookstore for current textbook.

### **Materials/Equipment Required:**

Personal safety and hand tools.

### **Attendance Policy:**

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

### **Grading Policy:**

The grading policy will be outlined by the instructor in the course syllabus.

### **Maximum class size:**

Based on classroom occupancy

### **Course Timeframe:**

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

**Refer to the following policies:**

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

**Disability Services Program:**

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.