

Bakersfield College  
**Course Outline of Record Report**  
 05/02/2022

## WELDB74A : Introduction to GMAW (Gas Metal Arc Welding) and FCAW (Flux Core Arc Welding)

### General Information

Author:	<ul style="list-style-type: none"> <li>Joshua Ralls</li> </ul>
Attachments:	WELD B74A Assessment Mapping Form.docx lab_manual_welding.pdf
Course Code (CB01) :	WELDB74A
Course Title (CB02) :	Introduction to GMAW (Gas Metal Arc Welding) and FCAW (Flux Core Arc Welding)
Department:	Welding
Proposal Start:	Summer 2023
TOP Code (CB03) :	(0956.50) Welding Technology
CIP Code:	(48.0508) Welding Technology/Welder
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	No
Course Control Number (CB00) :	CCC000191152
Curriculum Committee Approval Date:	04/18/2013
Board of Trustees Approval Date:	06/13/2013
External Review Approval Date:	07/01/2013
Course Description:	Theory and application of GMAW (Gas, Metal Arc Welding) and FCAW (Flux Core Arc Welding) welding processes. Emphasizes safe and proper operation of these welding processes while welding on mild steel.
Submission Rationale:	Change to Content Mandatory Revision  Minor revisions to the COR reflecting changes to equipment in the lab.
Author:	<ul style="list-style-type: none"> <li>Joshua Ralls</li> </ul>

### Minimum Qualifications

Discipline requiring a Master's Degree:	<ul style="list-style-type: none"> <li>Education</li> </ul>
Disciplines in which a Master's Degree is not usually available:	<ul style="list-style-type: none"> <li>Industrial Technology (Foundry occupations)</li> <li>Welding</li> </ul>
Disciplines in which a Master's Degree is not generally available BUT which requires a specific Bachelor's or Associate Degree:	<ul style="list-style-type: none"> <li>Education</li> </ul>

### Course Development Options

**Basic Skill Status (CB08)**

Course is not a basic skills course.

Allow Students to Gain Credit by Exam/Challenge

**Rationale For Credit By Exam/Challenge**

No value

In-Service Course (required by California Penal Code)

**Course Special Class Status (CB13)**

Course is not a special class.

**Allowed Number of Retakes**

0

**Retake Policy Description**

Non-Repeatable Credit

**Course Support Course Status (CB26)**

Course is not a support course

**Grade Options**

- Letter Grade Methods

**Course Prior To College Level (CB21)**

Not applicable.

Allow Students To Audit Course

### Associated Programs

Course is part of a program (CB24)

**Associated Program**

**Award Type**

**Active**

Manufacturing Technology Certificate of Achievement

Certificate of Achievement

Spring 2018 to Summer 2019

Manufacturing Technology Associate of Science

A.S. Degree Major

Spring 2018 to Summer 2019

Welding Associate of Science

A.S. Degree Major

Summer 2019

Gas Metal Arc/Gas Tungsten Arc/Flux Core Arc Welding Job Skills Certificate

Job Skills Certificate

Spring 2018 to Summer 2019

Welding Certificate of Achievement

Certificate of Achievement

Summer 2019

Welding Certificate of Achievement

Certificate of Achievement

Fall 2017 to Summer 2019

BC Manufacturing Technology Cert

Certificate of Achievement

Fall 2017 to Spring 2018

Welding Certification Job Skills Certificate (In Development)

Job Skills Certificate

Summer 2022

BC Industrial Technology, Manufacturing Technology Option AS	A.S. Degree Major	Fall 2017 to Spring 2018
Manufacturing Technology Certificate of Achievement	Certificate of Achievement	Summer 2019
Welding Certification Job Skills Certificate	Job Skills Certificate	Fall 2017
Manufacturing Technology Associate of Science	A.S. Degree Major	Summer 2019
BC Industrial Technology, Welding Option AS	A.S. Degree Major	Fall 2017 to Spring 2018
BC Gas Metal Arc/Gas Tungsten Arc Welding/Flux Core Arc Welding	Job Skills Certificate	Fall 2017 to Spring 2018
Welding Associate of Science	A.S. Degree Major	Spring 2018 to Summer 2019
Mechanized Agriculture Associate of Science	A.S. Degree Major	Summer 2019 to Spring 2020
Mechanized Agriculture Associate of Science	A.S. Degree Major	Summer 2019 to Summer 2019
Gas Metal Arc/Gas Tungsten Arc/Flux Core Arc Welding Job Skills Certificate	Job Skills Certificate	Summer 2019

### Transferability & Gen. Ed. Options

#### Course General Education Status (CB25)

Y

#### Transferability (CB05)

Not transferable

#### Transferability Status

Not transferable

### Units and Hours

#### Summary

<b>Minimum Credit Units (CB07)</b>	2
<b>Maximum Credit Units (CB06)</b>	2
<b>Total Course In-Class (Contact) Hours</b>	54
<b>Total Course Out-of-Class Hours</b>	54
<b>Total Student Learning Hours</b>	108

**Credit / Non-Credit Options**

<b>Course Credit Status (CB04)</b>	<b>Course Non Credit Category (CB22)</b>	<b>Non-Credit Characteristic</b>
Credit - Degree Applicable	Credit Course.	No Value

<b>Course Classification Code (CB11)</b>	<b>Funding Agency Category (CB23)</b>	<input type="checkbox"/> Cooperative Work Experience Education Status (CB10)
Credit Course. <input type="checkbox"/> Variable Credit Course	Not Applicable.	

**Weekly Student Hours**

	<b>In Class</b>	<b>Out of Class</b>
Lecture Hours	1.5	3
Laboratory Hours	1.5	0
Activity Hours	0	0

**Course Student Hours**

<b>Course Duration (Weeks)</b>	18
<b>Hours per unit divisor</b>	54
<b>Course In-Class (Contact) Hours</b>	
Lecture	27
Laboratory	27
Activity	0
<b>Total</b>	54
<b>Course Out-of-Class Hours</b>	
Lecture	54
Laboratory	0
Activity	0
<b>Total</b>	54

**Units and Hours - Weekly Specialty Hours**

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

## Pre-requisites, Co-requisites, Anti-requisites and Advisories

No Value

## Limitations on Enrollment

Limitations on Enrollment	Description
No value	No value

## Specifications

### Methods of Instruction

Methods of Instruction	Lecture
Rationale	Teacher-led didactic instruction
Methods of Instruction	Study
Rationale	Outside reading
Methods of Instruction	Audiovisual Presentations
Rationale	Videos of the welding process in the lecture environment
Methods of Instruction	Laboratory
Rationale	Student hands-on practice of skills and procedures
Methods of Instruction	Discussion
Rationale	Students talk with instructor and other students regarding method and application
Methods of Instruction	Demonstration
Rationale	Teacher-led demonstrations in the lab environment
<b>Assignments</b>	

Critical Thinking Assignment:

GMAW vs. FCAW: Which Should You Choose?

You are about to make the plunge and buy your first wire feeder welder and you don't want to waste your money on a toy that goes out with the trash in a few weeks. You most likely are very comfortable building things from wood, but you always wanted to step up to steel. You probably want to run it off of 115 volt input, so that it is very portable, but maybe stepping up to the 230 volt input machines with the option of welding thicker material (more than 1/4") is a valid point. You think the decision-making process is over when you are hit with yet another question - which welding process will you use? GMAW (MIG) or FCAW (flux-cored)? If you are like most novice welding operators, you may be confused as to the differences of these two choices. The best answer depends on 3 things. First, what you are welding. Second, where are you welding it. And third, the surface finish of what you are welding.

Prepare a written proposal for which process you would choose for your situation and support your answers. Follow the format discussed in class and in Canvas.

**Methods of Evaluation**

**Rationale**

Performance Exams	Students will demonstrate proficiency with GMAW and FCAW processes
Homework	Students will complete assessments outside of class
Skills Demonstration (in class)	The use of formative assessments during lab sessions
Written assignments	Demonstrate understanding of GMAW and FCAW - see the critical thinking example
Written Exams (Quizzes, Midterm, and/or Final Examination)	Mid-Term and Final exams include written and practical components

**Equipment**

No Value

**Textbooks**

Author	Title	Publisher	Date	ISBN
Jeffus	Jeffus, L. (2017) Welding Principles and Applications, 8th, Delmar Cengage Learning	Cengage	2017	1-305-49469-5

**Other Instructional Materials**

<b>Description</b>	Other Textbooks: Jeffus, L. (2012) Welding Principles and Applications, 7th, Delmar Cengage Learning
<b>Author</b>	
<b>Citation</b>	Introduction to GMAW (Gas Metal Arc Welding) and FCAW (Flux Core Arc Welding)
<b>Description</b>	Software: Delmar Cengage Learning. CourseMate, Version 1 ed. -Open Education Resource that is a companion to the text.
<b>Author</b>	
<b>Citation</b>	Introduction to GMAW (Gas Metal Arc Welding) and FCAW (Flux Core Arc Welding)

**Materials Fee**

\$40.00

## Learning Outcomes and Objectives

### Course Objectives

Upon successful completion of the class, the student will understand and demonstrate proper use of the machines and PPE.

Upon successful completion of the class, the student will demonstrate how to setup and operate the welding machine with the GMAW configuration.

Upon successful completion of the class, the student will demonstrate how to setup and operate the welding machine with the FCAW configuration.

Upon successful completion of the class, the student will understand the advantages of the different types of joints and be able to set up the different joints used in welding.

Upon successful completion of the class, the student will demonstrate welding in the 1G, 2G, 3G, and 4G positions.

Upon successful completion of the class, the student will be prepared to pass certification exams in all positions.

### CSLOs

Name	Expected SLO Performance
1. Upon successful completion of the course, the student will be able to explain how welding is used in industry and how it affects our economy.	70.0
2. Upon successful completion of the course, the student will be able to demonstrate the concept of safety and correct tool usage.	70.0
3. Upon successful completion of the course, the student will be able to demonstrate proper setup of the welding machine, the use of GMAW equipment, and explain how it is used.	70.0
4. Upon successful completion of the course, the student will be able to select and apply the appropriate filler materials used in GMAW.	70.0

## Outline

### Course Outline

#### 1. Syllabus & Introduction (1 Week)

Discuss Syllabus

Fill out personal introduction sheets

Begin reading Chapter 1 (Assign Review Questions)



**2. Safety & Equipment overview (PP) (2 Weeks)**

Equipment PP Presentation

Film on safety

Assign SAFETY QUIZ Chapter 2 (Take home)

Turn in review questions Chapter 1/ Safety Quiz

Equipment PP Presentation

Safety Sheet: Discuss and sign

Begin reading Chapter 10 (Assign Review Questions)

**3. GMAW (5 Weeks)**

Continue reading Chapter 10

Lecture & Demonstrate safe use of GMAW equipment.

Turn in Chapter 10 Review Questions

Read Chapter 11 (Assign Review Questions)

Lecture on filler wire (PP).

Explain Joint design (handouts)

Turn in review questions Chapter 11

Handout - "Parts of a Weld"

Discuss P-GMAW

**4. MIDTERM (1 Week)****5. FCAW (6 Weeks)**

Begin all FCAW exercises

Demonstrate Equipment set-up

Demonstrate 1G & 2G (FCAW)

Lecture on setup

Continue Ch. 12 Flux Core Arc Welding (Review questions)

Lecture on setup

Turn in Chapter 12 Review Questions

Start Ch. 13 Flux Core (Review Questions)

Discuss 3G & 4G Practice test setup.

Destructive testing

Turn in Chapter 13 Review Questions

Preparing the 3G destructive test

Preparing the overhead welding test

**6. Final Exam (1 Week)****Lab Outline****1. Lab Introduction (1 Week)****2. Safety & Equipment overview (PP) (2 Weeks)**

Safety setup

Booth assignments/ Clean up procedure/ Lab walk-through

**3. GMAW (5 Weeks)**

Lab Demo - Weldment No. 1 (Handout & PP) ER70S6

- Lab -Students demonstrate Weldment #1 1G & 2G
- Lab Demo. Weldment No. 1 3G down
- Lab - Students demonstrate Weldment #1 3G down
- Lab - Students demonstrate #2, #3, #4
- Lab - Demonstrate P-GMAW on 16 ga.
- Lab - Students practice P-GMAW on 16 ga.

**4. MIDTERM (1 Week)**

**5. FCAW – Mild Steel (6 Weeks)**

- Lab - Demonstrate Equipment set-up
- Lab - Demonstrate 1G & 2G (FCAW)
- Lab Students Demonstrate 1G & 2G Weldment #1
- Lab - Students demonstrate 1F (Scrap metal)
- Lab - Demonstrate 3G Up (FCAW)
- Lab - Students demonstrate 3G Up (Use Weldment #1)
- Lab - Demo 3G Practice Test
- Lab - Students demonstrate Practice Test
- Lab - Finish Practice Test & Bend Straps
- Lab - Start 3G Test 7" Plate
- Lab - Students finish 3G test
- Lab - Finish D1.1 FCAW Test and bend straps for Certification.
- Lab - Start weld 1" X 5" 3G Position
- Lab - Start weld 1" X 5" 4G Position
- Lab - WELD Certification Test

**6. Final Exam (1 Week)**

**Distance Education Criteria and Standards**

Please choose all of the delivery methods applicable to this course. Only choose ONE option for Hybrid.

- Face to face
- Hybrid (requires face-to-face meetings;0-50% online)

Rigor statement: The same standards of course quality shall be applied to distance education as are applied to traditional classroom courses in regard to the course quality judgments made pursuant to the requirements of Section 55002. The same expectations applies to any local course quality determination or review process.

- Methods of evaluation and out of class assignments are the same as for a face to face course.

If the methods of evaluation differ from a face to face courses, please indicate what the differences are and why they are being used.

N/A

If the face to face course has a lab, field trip, or site visit explain how these components will be performed in the online course. Be sure to identify how the lab component will differ from a homework assignment.

N/A

All approved courses offered as distance education shall include regular, effective contact between instructor and students. Effective methods are expected to be utilized by all instructors teaching the course but are not limited to the choices below. Choose the methods demonstrating effective INSTRUCTOR/STUDENT contact for this course. (Choose all that apply)

- Discussion Forum
- Email
- Face to face meetings (group or individual)
- Interactive Video
- Message board
- Review sessions

All approved courses offered as distance education shall include regular, effective contact between instructor and students. Effective methods are expected to be utilized by all instructors teaching the course but are not limited to the choices below. Choose the methods demonstrating effective STUDENT/STUDENT contact for this course. (Choose all that apply)

- Discussion Forum
- Email
- Face to face meetings (group or individual)
- Interactive Video

All approved courses offered as distance education shall include regular, effective contact between instructor and students. Effective methods are expected to be utilized by all instructors teaching the course but are not limited to the choices below. Choose the methods demonstrating effective STUDENT/CONTENT contact for this course. (Choose all that apply)

- Discussion Forum
- Email
- Face to face meetings (group or individual)
- Message board

Purely because of the delivery mode, will you require additional software or hardware beyond basic computer and web browser capabilities?

- No

Federal and state regulations require that all online course materials be made available in accessible electronic format. By checking both boxes below, the instructor is ensuring compliance with Section 508 of the Rehabilitation Act.

- Instructor will ensure the course is 508 compliant using the Course Management System and other toolss as needed.
- Instructor will ensure textbook and any other courses materials are 508 compliant.

A good practice is that section size should be no greater in distance education modes than in regular face to face versions of the course. Will the online section for this course differ from face to face sections?

- No

If the online section of the course will differ in size from face to face sections, please provide a rationale for the size difference.

N/A

Provide supplemental information for any OTHER choices in the sections above.

N/A