# WELDB53AN : Shielded Metal Arc Welding

## General Information

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author:</td>
<td>Klint Rigby</td>
</tr>
<tr>
<td>Attachments:</td>
<td>WELD B53ANC Critical Thinking Assignment.docx</td>
</tr>
<tr>
<td></td>
<td>WELD B53ANC AssessmentMappingForm.docx</td>
</tr>
<tr>
<td></td>
<td>WELD B53ANC.docx</td>
</tr>
<tr>
<td>Course Code (CB01) :</td>
<td>WELDB53AN</td>
</tr>
<tr>
<td>Course Title (CB02) :</td>
<td>Shielded Metal Arc Welding</td>
</tr>
<tr>
<td>Department:</td>
<td>Welding</td>
</tr>
<tr>
<td>Proposal Start:</td>
<td>Spring 2022</td>
</tr>
<tr>
<td>TOP Code (CB03) :</td>
<td>(0956.50) Welding Technology</td>
</tr>
<tr>
<td>CIP Code:</td>
<td>(48.0508) Welding Technology/Welder</td>
</tr>
<tr>
<td>SAM Code (CB09) :</td>
<td>Advanced Occupational</td>
</tr>
<tr>
<td>Distance Education Approved:</td>
<td>Yes</td>
</tr>
<tr>
<td>Course Control Number (CB00) :</td>
<td>CCC000625328</td>
</tr>
<tr>
<td>Curriculum Committee Approval Date:</td>
<td>06/03/2021</td>
</tr>
<tr>
<td>Board of Trustees Approval Date:</td>
<td>07/08/2021</td>
</tr>
<tr>
<td>External Review Approval Date:</td>
<td>07/01/2022</td>
</tr>
<tr>
<td>Course Description:</td>
<td>Basic arc welding theory and manipulative skills related to the shielded metal arc welding process, including welding in all positions with various electrodes.</td>
</tr>
<tr>
<td>Submission Rationale:</td>
<td>Add Distance Education</td>
</tr>
<tr>
<td></td>
<td>This course requires different coding to be allowed as an online/hybrid offering.</td>
</tr>
<tr>
<td>Author:</td>
<td>No value</td>
</tr>
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</table>

## Minimum Qualifications

<table>
<thead>
<tr>
<th>Discipline requiring a Master's Degree:</th>
<th>Engineering Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disciplines in which a Master's Degree is not usually available:</td>
<td>Welding</td>
</tr>
<tr>
<td>Disciplines in which a Master's Degree is not generally available BUT which requires a specific Bachelor's or Associate Degree:</td>
<td>No value</td>
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</tbody>
</table>
# Course Development Options

<table>
<thead>
<tr>
<th>Basic Skill Status (CB08)</th>
<th>Course Special Class Status (CB13)</th>
<th>Grade Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course is not a basic skills course.</td>
<td>Course is not a special class.</td>
<td>• Noncredit Grading (P/SP/NP, UG)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Allowed Number of Retakes</th>
<th>Retake Policy Description</th>
<th>Course Prior To College Level (CB21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>This is a noncredit course. Student can re-enroll as many times as necessary to achieve satisfactory progress.</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rationale For Credit By Exam/Challenge</th>
<th>Allow Students To Audit Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>No value</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In-Service Course (required by California Penal Code)</th>
</tr>
</thead>
</table>

# Associated Programs

<table>
<thead>
<tr>
<th>Course is part of a program (CB24)</th>
<th>Award Type</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associated Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Welding Processes Certificate of Completion (NC) (In Development)</td>
<td>Certificate of Completion (NC)</td>
<td>Summer 2022</td>
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</table>

# Transferability & Gen. Ed. Options

<table>
<thead>
<tr>
<th>Course General Education Status (CB25)</th>
<th>Transferability Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Not transferable</td>
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</table>

# Units and Hours: Non-Credit

<table>
<thead>
<tr>
<th>Summary</th>
</tr>
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<tbody>
<tr>
<td>Minimum Credit Units (CB07)</td>
</tr>
<tr>
<td>Maximum Credit Units (CB06)</td>
</tr>
<tr>
<td>Total Course In-Class (Contact) Hours</td>
</tr>
<tr>
<td>Total Course Out-of-Class Hours</td>
</tr>
</tbody>
</table>
Total Student Learning Hours

108

Credit / Non-Credit Options

Course Credit Status (CB04)
Non-Credit

Course Non Credit Category (CB22)
Workforce Preparation.

Non-Credit Characteristic
Learning Assistance

Course Classification Code (CB11)
Other Non-Credit Enhanced Funding.

Course Non Credit Category (CB22)
Workforce Preparation.

Funding Agency Category (CB23)
This course was primarily developed using Economic Development funds.

Variable Credit Course

Weekly Student Hours

<table>
<thead>
<tr>
<th>In Class</th>
<th>Out of Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Hours</td>
<td>1.5</td>
</tr>
<tr>
<td>Laboratory Hours</td>
<td>1.5</td>
</tr>
<tr>
<td>Activity Hours</td>
<td>0</td>
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</table>

Course Student Hours

Course Duration (Weeks)
18

Hours per unit divisor
54

Course In-Class (Contact) Hours

<table>
<thead>
<tr>
<th></th>
<th>Lecture</th>
<th>Laboratory</th>
<th>Activity</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>In Class</td>
<td>27</td>
<td>27</td>
<td>0</td>
<td>54</td>
</tr>
<tr>
<td>Out of Class</td>
<td>54</td>
<td>0</td>
<td>0</td>
<td>54</td>
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</table>

Course Out-of-Class Hours

<table>
<thead>
<tr>
<th></th>
<th>Lecture</th>
<th>Laboratory</th>
<th>Activity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>54</td>
<td>0</td>
<td>0</td>
<td>54</td>
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</tbody>
</table>

Units and Hours: Non-Credit - Weekly Specialty Hours

<table>
<thead>
<tr>
<th>Activity Name</th>
<th>Type</th>
<th>In Class</th>
<th>Out of Class</th>
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</thead>
<tbody>
<tr>
<td>No Value</td>
<td>No Value</td>
<td>No Value</td>
<td>No Value</td>
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Pre-requisites, Co-requisites, Anti-requisites and Advisories

No Value
### Limitations on Enrollment

<table>
<thead>
<tr>
<th>Limitations on Enrollment</th>
<th>Description</th>
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### Specifications

#### Methods of Instruction

<table>
<thead>
<tr>
<th>Methods of Instruction</th>
<th>Lecture</th>
<th>Rationale</th>
<th>No value</th>
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<tr>
<td>Methods of Instruction</td>
<td>Study</td>
<td>Rationale</td>
<td>No value</td>
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<tr>
<td>Methods of Instruction</td>
<td>Lecture / Discussion</td>
<td>Rationale</td>
<td>No value</td>
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<tr>
<td>Methods of Instruction</td>
<td>Class Activities</td>
<td>Rationale</td>
<td>No value</td>
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<tr>
<td>Methods of Instruction</td>
<td>Laboratory</td>
<td>Rationale</td>
<td>No value</td>
</tr>
<tr>
<td>Methods of Instruction</td>
<td>Discussion</td>
<td>Rationale</td>
<td>No value</td>
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<tr>
<td>Methods of Instruction</td>
<td>Demonstration</td>
<td>Rationale</td>
<td>No value</td>
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<tr>
<td>Methods of Instruction</td>
<td>Project Based Learning</td>
<td>Rationale</td>
<td>Consumable welding project completed in class</td>
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</table>
Assignments

Consumable welding project completed in class

Methods of Evaluation

<table>
<thead>
<tr>
<th></th>
<th>Rationale</th>
</tr>
</thead>
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<tr>
<td><strong>Homework</strong></td>
<td>No value</td>
</tr>
<tr>
<td><strong>Performance Exams</strong></td>
<td>No value</td>
</tr>
<tr>
<td><strong>Skills Demonstration (in class)</strong></td>
<td>No value</td>
</tr>
<tr>
<td><strong>Written Exams (Quizzes, Midterm, and/or Final Examination)</strong></td>
<td>No value</td>
</tr>
<tr>
<td><strong>Cumulative Final Examination</strong></td>
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Equipment

Without Equipment.

Textbooks

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
<th>Date</th>
<th>ISBN</th>
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<td>No Value</td>
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Other Instructional Materials

| Author               | Jeffus, Larry                             |
| Citation             | ISBN 9780357377789                       |

Materials Fee

Will submit documents to the BOT

Learning Outcomes and Objectives

Course Objectives

1. The student will understand how welding is used in industry and how it affects our economy.
2. Students will understand the concept of safety, correct tool usage, and practice it.

3. Students will understand the use of SMAW equipment and explain how it is used.

4. Students will understand the various filler materials used in SMAW.

5. Students will understand the most commonly used weld joint designs.

6. Students will understand different methods of testing welds.

7. Students will understand basic electrical terms: amperage, volts, resistance, polarity, and ground as it relates to welding.

8. Students will understand when a welder is certified to a welding procedure.

9. Students will understand the relationship of codes to the welds being made.

10. Students will understand how to properly prepare and setup a 3G & 4G test.

CSLOs

1. Upon successful completion of the course, the student will be able to demonstrate an understanding through the application of safety concepts as they are related to welding equipment, cutting equipment, shop equipment, and hand tools. Expected SLO Performance: 70.0

2. Upon successful completion of the course, the student will be able to examine, recognize and demonstrate the application of welding equipment, filler metals, and apply this process to commonly used weld joints. Expected SLO Performance: 70.0

3. Upon successful completion of the course, the student will be able to locate, manipulate, and solve math problems that pertain to welding projects based on the U.S. customary inch. Expected SLO Performance: 70.0

4. Upon successful completion of the course, the student will be able to employ acquired skills to identify, illustrate, and apply knowledge of weld joint configurations, discontinuities, and defects and their application to welding codes. Expected SLO Performance: 70.0

Outline

Course Outline

DETAILED TOPICAL OUTLINE:
A. Unit 1 SMAW – Introduction
1. The development of arc welding equipment
2. The development of the shielded metal arc electrodes
3. Arc Welding accessories
   1. electrode holders
   2. welding hoods
   3. welding lenses
   4. cables

B. Unit 2 SMAW – SAFETY
1. Electrical Shock
   1. grounded machine and work piece
   2. electricity and water
2. Burns, Ultra violet and infrared rays
   1. proper clothing - leathers, gloves
   2. protect all exposed skin
   3. quenching metal - steam
   4. correct eye protection
3. Toxic related to welding
   1. Smoke and fumes from welding on:
      a. galvanize
      b. lead
      c. brass
      d. stainless steel
   2. Proper Ventilation
      a. positioning weldments under ventilation hood
      b. adequate fresh air supply
      c. welding in tanks and other containers

4. Handling and preparing metal
1. Shearing
2. Grinding
   a. pedestal grinder
   b. hand held grinders
3. Wire wheel
4. Carrying long lengths of steel
5. Lifting heavy objects

C. Unit 3 Striking the Arc
1. Tapping, scratching methods
2. Arc Length
3. Correct angle of electrode
4. Direction of Travel

D. Unit 4 Electrical Terms
1. Amperage, volts, OCV
2. Resistance
3. Conductors
4. Polarity

E. Unit 5 Joint Design
1. Discussion on weld joint design
   1. penetration qualities
   2. arc stability
   3. deposition rates
   4. tensile strength
2. The nature of Flux for the coated Electrode
   1. primary constituents, chemistry
   2. effects of flux coating on weld quality

F. Unit 6 SMAW – Weld Exercise
1. Adjusting the SMAW machines
2. Practice welding on various joints
   1. lap, tee and butt joints
3. Welding with E-7018 in various positions

G. Unit 7 SMAW Consumable
1. AWS classification system
2. Electrode series e.g. low hydrogen, iron powder, etc.
3. Electrode characteristics
   1. penetration qualities
   2. arc stability
   3. deposition rates
   4. tensile strength
4. The nature of Flux for the coated Electrode
1. primary constituents, chemistry
2. effects of flux coating on weld quality

H. Unit 8 Power Sources
1. Constant Current
2. Constant Potential

I. Unit 9 SMAW – Weld Exercises
1. Adjusting the SMAW machines
2. Practice welding on various joints
   1. lap, tee, edge and butt joints
3. Welding with E-7018, in various positions

J. Unit 10 Final & Clean-up

Lab Outline

Lab:

Unit 2 SMAW – SAFETY (4 hours)
- Electrical Shock
  1. grounded machine and work piece
  2. electricity and water
- Burns, Ultra violet and infrared rays
  1. proper clothing - leathers, gloves
  2. protect all exposed skin
  3. quenching metal - steam
  4. correct eye protection
- Toxic related to welding
  1. Smoke and fumes from welding on:
    a. galvanize
    b. lead
    c. brass
    d. stainless steel
  2. Proper Ventilation
    a. positioning weldments under ventilation hood
    b. adequate fresh air supply
    c. welding in tanks and other containers
- Handling and preparing metal
  1. Shearing
  2. Grinding
    a. pedestal grinder
    b. hand held grinders
  3. Wire wheel
  4. Carrying long lengths of steel
  5. Lifting heavy objects

Unit 3 Striking the Arc (3 hours)
- Tapping, scratching methods
- Arc Length
- Correct angle of electrode
- Direction of Travel

Unit 4 Electrical Terms (3 hours)
- Amperage, volts, OCV
- Resistance
- Conductors
- Polarity

Unit 5 Joint Design (3 hours)
- Discussion on weld joint design
  1. penetration qualities
  2. arc stability
  3. deposition rates
  4. tensile strength
- The nature of Flux for the coated Electrode
  1. primary constituents, chemistry
  2. effects of flux coating on weld quality

Unit 6 SMAW – Weld Exercise (3 hours)
- Adjusting the SMAW machines
Distance Education Criteria and Standards_3.1

Please choose all of the delivery methods applicable to this course.

- Face to Face
- Hybrid (requires face to face meetings)
- Online (Flexible, purely online no face to face contact)

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.

No Value

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.

No Value

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)

- Email and other online Messaging
- Face to face meetings (group or individual)
- Interactive Video
- Library Workshop
- Archived Video/ Lecture Recordings

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)

No Value

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)

No Value

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 an 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 tools 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.

No Value

Provide supplemental information for all OTHER options chosen in the sections above.

No Value