

COURSE OUTLINE

Gas Welding and Cutting
Course Title

WE 110
Dept and Course Number

I. COURSE DESCRIPTION

This course provides an introduction to the safe operation of gas welding equipment and instruction in the fundamentals of fusion welding of ferrous metals in various positions.

II. SEMESTER CREDIT: 3

III. CONTACT HOURS PER WEEK:

| | | |
|----------|----------|----------|
| <u>2</u> | <u>3</u> | <u>5</u> |
| Lecture | Lab | Total |

IV. PREREQUISITE: None

V. STUDENT LEARNING OUTCOMES:

Upon completion of the course, the students will be able to, with 65% accuracy to:

1. Identify the parts of the oxyacetylene welding outfit.
2. Explain the function and uses of each part.
3. Show the proper way to secure cylinders.
4. Assemble the oxyacetylene outfit.
5. Test the leak of the system.
6. Demonstrate opening and closing the system properly.
7. Demonstrate lighting the welding torch and adjusting the flame to carburizing, neutral and oxidizing.
8. Explain the safety precaution in using the equipment.
9. Demonstrate running a weld pool.
10. Show running a weld bead with filler.

VI. COURSE CONTENT:

- A. Parts of the oxyacetylene outfit.
 1. Acetylene cylinder
 2. Oxygen cylinder
 3. Acetylene and Oxygen regulator
 4. Welding and Cutting Torch
 5. Welding Hoses
- B. Parts Functions and Uses
- C. Securing cylinders
- D. Assembling procedures
- E. Leak testing
- F. Procedures in opening and closing the system.
- G. Lighting the torch and adjusting flames.
 1. Carburizing
 2. Neutral
 3. Oxidizing
- H. Safety Precautions
- I. Running a weld pool
 1. Torch manipulation
 2. Flame adjustments
- J. Running weld bead
 1. Torch manipulation
 2. Travel of speed

11. Define base metal and filler rod.
 12. Show the proper way of tacking the parts.
 13. Demonstrate welding sheet metal in 1G, 2G, 3G and 2F position
 14. Demonstrate welding pipe in 2G, 5G and 6G position.
 15. Identify the different filler metal used in brazing and soldering.
 16. Differentiate brazing and soldering from fusion welding.
 17. Demonstrate welding dissimilar metal using brazing and soldering.
 18. Describe cutting torch and welding torch construction.
 19. Adjust the correct flame for cutting.
 20. Explain the procedures in cutting.
 21. Demonstrate cutting a steel plate straight and at right angle and at an angle of 30 degrees.
 22. Demonstrate piercing a steel plate.
3. Working angle
 4. Feeding the filler
 - K. Definition
 1. Base metal
 2. Filler rod
 - L. Tacking prior to welding
 1. Pitch to pitch center distance
 2. Size of tack
 3. Flame adjustment
 - M. Welding positions, sheet metal
 1. 1G
 2. 2G
 3. 3G
 4. 2F
 - N. Welding positions, pipe
 1. 2G
 2. 5G
 3. 6G
 - O. Filler Metal
 1. Brass
 2. Bronze
 3. Silver
 4. Aluminum
 5. Solder
 - P. Definition
 1. Brazing
 2. Soldering
 3. Fusion welding
 4. Temperature
 - Q. Welding dissimilar metal
 1. Steel to brass
 2. Cast iron to bronze
 3. Stainless to brass
 - R. Construction
 1. Cutting torch
 2. Welding torch
 - S. Kinds of flame
 1. Carburizing
 2. Neutral
 3. Oxidizing
 - T. Procedures in cutting
 - U. Cutting a plate
 1. straight and at right angle
 2. at an angle of 30 degrees
 - V. Piercing a steel plate
 1. Round shape
 2. Square shape

- 23. Define welding symbols.
- 24. Draw and identify the basic weld symbols.

25. Draw and identify the five kinds of joint.

26. Identify the parts of a welding symbol.

27. Explain arrow side, other side and both sides.

28. Draw and explain the weld nomenclature.

VII. MATERIALS AND EQUIPMENT:

- A. Oxyacetylene equipment/accessories
- B. Filler metal/ rod
- C. B. I. sheet
- D. B. I. pipe
- E. Welding table
- F. Cutting table
- G. Welding positioner
- H. Fluxes
- I. Mechanical pliers

VIII. TEXT AND REFERENCES:

- A. Text: Instructors Made Handouts

IX. METHOD OF INSTRUCTION:

- Lecture- Discussion
- Demonstration
- Projects

- 3. Irregular
- W. Definition
- X. Basic weld symbols
 - 1. Square
 - 2. Fillet
 - 3. Single V
 - 4. Bevel
 - 5. Double V
 - 6. Bead
 - 7. Melt thru
 - 8. Finish symbol

- Y. Kinds of joint
 - 1. T – joint
 - 2. Butt joint
 - 3. Lap joint
 - 4. Corner joint
 - 5. Edge joint

- Z. Parts of a welding symbol
 - 1. Reference line
 - 2. Arrow
 - 3. Tail

- AA. Location of weld
 - 1. Arrow side
 - 2. Other side
 - 3. Both sides

- BB. Weld nomenclature

- J. Steel brush
- K. Shearing machine
- L. Aviation snips
- M. Vise clamp
- N. Ball peen hammer
- O. Spark lighter
- P. Machine Vise
- Q. Goggles/gloves
- R. Long sleeve shirt

X. METHOD OF EVALUATION:

The components with corresponding weight in percent included in the computation of the final grades are:

| | |
|-----------------------------|------------|
| Class participation..... | 10% |
| Quizzes/Short Tests..... | 10% |
| Midterm Exams..... | 15% |
| Final Exams | 15% |
| Project / Performance | <u>50%</u> |
| Total | 100% |

The conversion of percent rating to letter grade is as follows:

| | |
|--------------|---|
| 90-100%..... | A |
| 80-89%..... | B |
| 70-79%..... | C |
| 65-69%..... | D |
| 00-64%..... | F |

FORM NC-2
TASK LISTING SHEET

WE 110 Gas Welding and Cutting
Course No. Title

Credit:

2

1

48

Lec

Lab

Total Lab Hrs

| | | Allotted Hours |
|--------------------|--|----------------|
| 1. | CLO 1 a. Secure cylinders. b. Assemble the equipment. c. Test the system leak. d. Open and close the system. e. Light the welding torch. f. Adjust the flame to carburizing, neutral and oxidizing. g. Shut off the flame. h. Identify welding equipment and accessories | 8 |
| 2. | CLO 2 a. Run a weld pool. b. Run a bead. c. Weld sheet metal in 1G, 2G, 3G, and 2F position. d. Weld pipe in 2G, 5G and 6G position. | 25 |
| 3. | CLO 3 a. Braze weld steel pipe and dissimilar metals. b. Solder steel pipe/sheet. c. Test the weld leak. | 8 |
| 4. | CLO 4 a. Cut the steel plate straight and right angle. b. Cut the steel plate at an angle of 30 degrees. c. Piercing | 6 |
| 5. | CLO 5 a. Identify specific location of elements. b. Draw the weld desired in a given welding symbol. | 1 |
| TOTAL HOURS | | 48 |

Palau Community College
WE 110 Gas Welding and Cutting
Course Learning Outcomes

During the course experience, the **course learning outcomes** (CLO) will be assessed through the use of signature assignments. A rating scale will be used to determine the students' proficiency level of each CLO using specifically aligned assignments. The numerical rating of 4,3,2 and 1 are not intended to represent the traditional school grading system of A, B, C, D and F. The descriptions associated with each of the numbers focus on the level of student performance for each of the course learning outcome listed below.

Rating Scale: 4.....Exceeds Expectations
 3.....Meets Expectations
 2.....Developing
 1.....Below Expectations

CLO #1: Students will be able to set up gas welding equipment and accessories.

| | |
|---|---|
| 4 | Perform the following tasks accurately and completely <ul style="list-style-type: none"> • Secure cylinders • Assemble the equipment • Test the system for leaks • Open and close the system • Light the welding torch, adjust the flame to carburizing, neutral and oxidizing • Shut off the flame |
| 3 | Perform the tasks mentioned above with mixed quality, but most are adequate and complete |
| 2 | Perform the tasks mentioned above with mixed quality, but most are inadequate and incomplete |
| 1 | Perform all the tasks mentioned above inaccurately and incompletely |

CLO #2: Students will be able to weld sheet metal butt joints in flat, horizontal and vertical positions.

| | |
|---|--|
| 4 | Perform the following tasks accurately and completely <ul style="list-style-type: none"> • Run a weld pool • Run a bead • Weld sheet metal in 1G, 2G, 3G, and 2F positions • Weld pipe 2G, 5G and 6G positions |
| 3 | Perform the tasks mentioned above with mixed quality, but most are adequate and complete |
| 2 | Perform the tasks mentioned above with mixed quality, but most are inadequate and incomplete |
| 1 | Perform all the tasks mentioned above inaccurately and incompletely |

CLO #3: Students will be able to perform brazing and torch soldering.

| | |
|---|--|
| 4 | Perform the following tasks accurately and completely <ul style="list-style-type: none"> • Braze weld pipe and dissimilar metals • Solder steel pipe and sheet • Test the weld leak |
| 3 | Perform the tasks mentioned above with mixed quality, but most are adequate and complete |
| 2 | Perform the tasks mentioned above with mixed quality, but most are inadequate and incomplete |
| 1 | Perform all the tasks mentioned above inaccurately and incompletely |

CLO #4: Students will be able to cut a steel plate manually using the cutting torch.

| | |
|---|--|
| 4 | Perform the following tasks accurately and completely <ul style="list-style-type: none">• Cut a steel plate straight and at right angle• Cut a steel plate at an angle of 30 degrees• Pierce the steel plate |
| 3 | Perform the tasks mentioned above with mixed quality, but most are adequate and complete |
| 2 | Perform the tasks mentioned above with mixed quality, but most are inadequate and incomplete |
| 1 | Perform all the tasks mentioned above inaccurately and incompletely |

CLO #5: Students will be able to interpret welding symbols in a blueprint.

| | |
|---|---|
| 4 | Perform the following tasks accurately and completely <ul style="list-style-type: none">• Identify specific location of elements• Draw the weld desired in given welding symbols |
| 3 | Perform the tasks mentioned above with mixed quality, but most are adequate and complete |
| 2 | Perform the tasks mentioned above with mixed quality, but most are inadequate and incomplete |
| 1 | Perform both tasks mentioned above inaccurately and incompletely |