

Las Positas College  
3000 Campus Hill Drive  
Livermore, CA 94551-7650  
(925) 424-1000  
(925) 443-0742 (Fax)

**Course Outline for WLDT 72B**  
**INTERMEDIATE LASER WELDING**  
**Effective: Spring 2018**

**I. CATALOG DESCRIPTION:**

WLDT 72B — INTERMEDIATE LASER WELDING — 3.00 units

This course will cover the theory and applied skills associated with modern laser welding of metals and materials. Hands-on use of the laser welding equipment will be shown along with typical applications. The different types of joint configurations for welding will be covered. The tools for measuring and monitoring laser welding performance will be explored. Methods of inspection, as well as defect detection, their cause and corrective action will be discussed. Practical application of codes and specifications for industrial laser welding applications will be reviewed. Laser welding safety requirements and personal protective equipment.

1.00 Units Lecture 2.00 Units Lab

**Prerequisite**

WLDT 72A - Beginning Laser Welding  
with a minimum grade of C  
(May be taken concurrently)

**Grading Methods:**

Letter or P/NP

**Discipline:**

- Welding

	<b>MIN</b>
<b>Lecture Hours:</b>	18.00
<b>Lab Hours:</b>	108.00
<b>Total Hours:</b>	126.00

**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1**

**III. PREREQUISITE AND/OR ADVISORY SKILLS:**

**Before entering the course a student should be able to:**

**A. WLDT72A**

1. Explain the basic types of lasers used for industrial welding and cutting;
2. Describe the basic concepts associated with lasers and how the beam is generated;
3. Explain the concept of power density;
4. Describe the types of metals and materials that can be processed with lasers;
5. List the components of the beam delivery optics;
6. Explain the concept of pulsed laser welding and its advantages, disadvantages and applications;
7. Explain the concept of continuous power laser welding and its advantages, disadvantages and applications;
8. Explain the role of shielding gas and the gasses used for laser welding and cutting;
9. Explain why metallurgy of laser welding differs from that of conventional welding techniques ;
10. Explain the process of Laser cutting;

**IV. MEASURABLE OBJECTIVES:**

**Upon completion of this course, the student should be able to:**

- A. Describe laser welding hazards, safety and personal protective equipment use ;
- B. Locate and identify components of the beam delivery optics;
- C. Describe tools and equipment used to measure power of the laser beam;
- D. Describe tools and equipment used to measure spot size;
- E. Describe welds of typical joint configurations used for laser welding;
- F. Demonstrate methods for laser weld inspection, before, during and after welding;
- G. Demonstrate the role of shielding gas and the gasses used for laser welding and cutting;

**V. CONTENT:**

- A. Laser welding hazards, safety and personal protective equipment use
- B. Components of the beam delivery optics
- C. Tools and equipment used to measure power of the laser beam

- D. Tools and equipment used to measure spot size
- E. Welding of typical joint configurations used for laser welding
- F. Methods for laser weld inspection, before, during and after welding
- G. Shielding gas and the gasses used for laser welding and cutting

#### VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. **Field Trips** -
- C. **Demonstration** -
- D. Videos

#### VII. TYPICAL ASSIGNMENTS:

- A. Lectures
  - 1. The safety of working with lasers in the lab.
  - 2. How to measure spot size.
- B. Reading assignment:
  - 1. Read the textbook chapter on welding inspection.
  - 2. Locate and read an article off the internet authored in the last 90 days on the subject of laser welding defects and discontinuities, write a summary of what you read
- C. Homework:
  - 1. Read the textbook chapter on Optics and answer the questions at the end of the chapter:
- D. Class and group discussions:
  - 1. Class discussion: What is the effect of spot size in a laser welding?
  - 2. Group discussion: How does travel speed effect the appearance and penetration of a laser weld?
- E. Audio-visual materials:
  - 1. Video of Non Destructive Examination (NDE).
- F. Field trip:
  - 1. Visit a local supplier of material used for welding.
- G. Research project:
  - 1. Explain the differences between pulsed laser welding and CW welding

#### VIII. EVALUATION:

##### A. **Methods**

- 1. Exams/Tests
- 2. Quizzes
- 3. Projects
- 4. Class Participation
- 5. Class Work
- 6. Home Work
- 7. Lab Activities

##### B. **Frequency**

- 1. Exams once per semester
- 2. Quizzes biweekly
- 3. Projects on an as assigned basis
- 4. Participation will be evaluated daily
- 5. Work samples will be submitted for grading as completed over the duration of the semester
- 6. Homework as assigned
- 7. Lab safety and proper use of tools will be evaluated on a daily

#### IX. TYPICAL TEXTS:

- 1. Steen, W.M., & Mazumder, J. (2010). *Laser Material Processing* (4th ed.). London, England: Springer-Verlag.
- 2. American Welding Society (2017). *Process Specification and Operator Qualification for Laser Beam Welding* (C7.4M ed.). Miami, Florida: American Welding Society.
- 3. Engel, S.L. (2017). *Laser Welding Technology Student Learning Manual* (1st ed.). Elk Grove, CA: HDE Technologies.
- 4. Engel, S.L. (2017). *Laser Welding Technology Shop Practice Workbook* (1st ed.). Elk Grove, CA: HDE Technologies.

#### X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Calculator
- B. Welding safety glasses