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Course Outline for WLDT 10

MACHINING FOR THE METAL TRADES

Effective: Fall 2018

I. CATALOG DESCRIPTION:
WLDT 10 — MACHINING FOR THE METAL TRADES — 3.00 units

This course is intended to show how machine tools are used in the metal trades and manufacturing, as well as how machine tools operate and when to use one particular machine instead of another. The advantage and disadvantage of various machining techniques as well as their application in the fabrication process are explored. Students will learn the use of drawings, hand tools, precision measuring tools, drilling machines, grinders, lathes, milling machines, and other specialized tools used to shape and finish metal and nonmetal parts. Additive and subtractive manufacturing techniques as well as related processes are explored.

1.00 Units Lecture 2.00 Units Lab

Grading Methods:
Letter or P/NP

Discipline:
- Welding

	MIN
Lecture Hours:	18.00
Expected Outside of Class Hours:	36.00
Lab Hours:	108.00
Total Hours:	162.00

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

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

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

A. Properly use precision measuring tools, such as the vernier caliper, vernier height gauge, dial test indicator, and various types of micrometers;
B. Perform common bench operations, such as filing, sawing, deburring and hand threading;
C. Set up and perform basic drill press, bandsaw, lathe and vertical milling machine operations;
D. Make precision layouts on the surface plate using precision layout tools, such as the vernier height gauge, angle plates, parallels, and V-blocks;
E. Apply basic mathematical formulas for calculating correct speeds, feeds, and data required for precision part layout;
F. Evaluate a blueprint to make a manufacturing plan to produce the desired machine part;
G. Safely setup and operate a manual lathe to make a part manufactured within the part drawing tolerances;
H. Safely setup and operate a manual milling machine to make a part manufactured within the part drawing tolerances;
I. Offhand grind a High Speed Steel Toolbit;
J. Measure the parts manufactured and evaluate whether the piece part is acceptable to the print tolerance, geometries and published machining standards such as ANSI Y14.5M

V. CONTENT:
A. Precision measuring tools
    1. Standards
    2. Micrometers
    3. Calipers
    4. Height gages
    5. Precision pins
B. Identity of benchworking tools
    1. Combination square set
    2. Trammel points
    3. Center/prick punches
    4. Wrenches
    5. Hammers
C. Layout methods

1. Blueprint interpretation
2. Part layout techniques

D. Screw threads
1. Types
2. Styles
3. Dimension standards

E. Drill presses
1. Speeds and feeds

F. Explanation and examples of bandsaws
1. Operations
2. Safely setting speeds

G. Basic lathe
1. Operations
a. Turning
b. Facing
c. Drilling
2. Tool and machine setup
a. Beginning operations
3. Identification
a. Parts
b. Components
c. Accessories

H. Basic vertical milling machines
1. Operations
a. Speeds and feeds
2. Identification
a. Parts
b. Components
c. Accessories
3. Setup clamping
4. Indicating methods and techniques

I. Evaluate and inspect parts produced in class
1. Prepare inspection reports

J. Manufacturing/fabrication
1. Job opportunities
2. Specialties
3. Trends

VI. METHODS OF INSTRUCTION:

A. **Demonstration** -
B. **Lecture** -
C. **Lab** -

VII. TYPICAL ASSIGNMENTS:

A. Lecture
1. Read chapter in the text on cutting tools. Work with a partner to calculate the proper Lathe RPM based on the cutting speed of different materials.

B. Laboratory
1. Using a technical drawing provided, drill and tap the holes in the locations shown, within the stated toleranc.

C. Homework
1. Using a technical drawing provided, list the steps, the equipment, and tools needed to manufacture the components shown.
2. List the steps in order on the manufacturing traveler form.

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Home Work
4. Lab Activities

B. **Frequency**

1. Exams and Tests
a. Midterm and Final
2. Quizzes
a. As assigned
3. Homework
a. As assigned
4. Lab Work
a. As assigned

IX. TYPICAL TEXTS:

1. Walker, John , and Bob Dixon. *Machining Fundamentals* . 9th ed., Goodheart Wilcox, 2015.
2. Oberg, Erik, Franklin Jones, Holbrook Horton, Henry Ryffel, and Christopher McCauley. *Machinery's Handbook.* 30th ed., Industrial Press, 2016.
3. Walker, John, and Kenneth Stier. *Modern Metalworking.* 10th ed., Goodheart Wilcox, 2017.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Safety Glasses, Leather Gloves, Calculator