

Course Objectives/Course Outline

Spokane Community College

Course Title: Precision Machining II

Prefix and Course Number: APM 102

Course Learning Outcomes:

By the end of this course, a student should:

- Describe and follow shop safety and shop maintenance protocols. (1, 6)
- Demonstrate how to operate a manual mill, lathe, and grinder. (1, 2, 4, 6)
- Demonstrate how to perform part finishing operations such as honing. (1, 6)
- Interpret work orders and setup documentation. (1, 6)
- Demonstrate proper tool selection for specific machine operations. (1, 2, 4, 6)
- Identify different types of work holding methods and demonstrate holding parts in vises, chucks and fixturing. (1, 2, 4, 6)
- Identify three important goals for job planning: high quality, low cost, and safe operations. (1, 3, 6)
- Read and interpret basic drawings to plan the machining process (1, 2, 3, 6)
- Demonstrate correct use and calibration of precision measuring tools i.e. micrometers, calipers, gauge blocks, bore gauges, height gauges, and indicators. (1, 2, 6)
- Demonstrate proficiency of the following machining skills: (1, 2, 3, 4, 6)
 - a. Hole finishing
 - b. Threading
 - c. Sawing material with excess
 - d. Surface finish, deburr
 - e. Tramming heads
 - f. Dialing vises
 - g. Loading material
 - h. Make accurate cuts and square a block
 - i. Reading dials
 - j. Backlash
 - k. Demonstrate climb vs. conventional cutting
 - l. Adhere to print tolerances
 - m. Proper tool selection
 - n. Turning and facing
 - o. Proper speeds and feeds
 - p. Use of measuring tools

Course Outline:

- I. **Week One**
 - A. Introduction
 - B. C-Clamp Project Introduction
 - C. Safety Review and Quiz

- D. Machining Review
- E. Review Measuring Tools
- F. Shop Tour (vises, handles, wrenches, collets, chucks, jaws)
- G. Maintenance (vital fluids, damage, FOD, alignment)

II. Week Two

- A. QA/QC & Process Planning
- B. Layout
- C. Drill Press Operation & Safety
- D. Lab: Planning the C-clamp project

III. Week Three

- A. Sawing Safety and Introduction
- B. Lab: Drilling and Sawing the C-Clamp

IV. Week Four

- A. Lathe Safety and Overview
- B. Workholding and Toolholding Devices
- C. Machine Operations on the Lathe
- D. Lab: Milling Machine Alignment & Backlash
- E. Milling C-Clamp Project
- F. Lathe Chuck Center

V. Week Five

- A. Manual lathe threading
- B. Taper Turning
- C. Lab: Turning C-Clamp Project

VI. Week Six

- A. Mid-Term
- B. Continue with Project

VII. Week Seven

- A. Grinder introduction and safety
- B. Grinding wheels
- C. Lab: Drill and Tap; C-clamp project

VIII. Week Eight

- A. Surface grinding operations
- B. Angles and Cylindrical Work
- C. Lab: Grinder Demonstration, continue C-Clamp project

IX. Week Nine

- A. Surface Finishing
- B. Grinding

X. Week Ten

- A. Open Lab

XI. Week Eleven

- A. Review for Final
- B. Continue with Project

XII. Week Twelve

- A. Written Final and skills checklist