

# SYLLABUS

**DIVISION:** Business and Engineering Technology

**REVISED:** Fall 2014

**CURRICULA IN WHICH COURSE IS TAUGHT:** Precision Machining Technology

**COURSE NUMBER AND TITLE:** MAC 222 – Advanced Machine Tool Operations II

**CREDIT HOURS:** 7 **HOURS/WK LEC:** 4 **HOURS/WK LAB:** 9 **LEC/LAB COMB:** 13

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## I. CATALOG DESCRIPTION:

- Focuses on advanced lathe and millwork with concentration on fits, finishes, inspection, quality control, and basic heat-treating.
- Includes design and construction of specific projects to determine the student's operational knowledge of all equipment.
- Continued study of advanced layout, precision measurements, assembly of manufactured projects, milling machine operations, grinding machines and heat treating.

## II. RELATIONSHIP OF THE COURSE TO CURRICULA OBJECTIVES:

- To develop in the student an understanding of these machines and the ability to operate them.

## III. REQUIRED BACKGROUND/PREREQUISITES:

- MAC 101-102-221

## IV. COURSE CONTENT:

### 1. Milling Machines

- Safety
- Countersinks and Counterbores
- Slitting Saws
- Horsepower calculations
- Precision Set-ups
- Work-holding methods
- Work-piece squaring

### 2. Advanced Tooling

- Machinability and Chip Formation
- Speeds and Feeds
- Cutting Fluids
- Carbides
  - Composition
  - Identification
  - Selections
- Other Tool Materials
- Face Milling

### 3. Metallurgy

- Steels
- Nonferrous Metals
- Hardening, Case Hardening, Tempering
- Annealing, Normalizing, Stress Relieving
- Hardness Testing

### 4. Grinding and Abrasive Machining Processes

- Grinding Wheels
  - Selection and Identification
  - Truing, Dressing, and Balancing
- Surface Grinders
  - Work Holding
  - Using the Surface Grinder
  - Problems and Solutions
- Work-piece Preparation

**V. THE FOLLOWING GENERAL EDUCATION OBJECTIVES WILL BE ADDRESSED IN THIS COURSE (Place X by all that apply)**

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|--|-------------------------------------|
| <u>  X  </u> Communications                  | <u>  X  </u> Personal Development   |
| <u>  X  </u> Critical Thinking               | <u>  X  </u> Quantitative Reasoning |
| <u>  X  </u> Cultural & Social Understanding | <u>      </u> Scientific Reasoning  |
| <u>  X  </u> Information Literacy            |                                     |

**VI. LEARNER OUTCOMES**

**VII. EVALUATION**

<p><b>Learner outcome</b></p> <ul style="list-style-type: none"> <li>Demonstrate ability to safely setup and operate milling machines.</li> </ul>	<p><b>Evaluation method</b></p> <p>Lab exercises In class assignments Written tests</p>
<p><b>Learner outcome</b></p> <ul style="list-style-type: none"> <li>Demonstrate ability to identify and select the proper tools and tool holders for specific machine operations and workpiece materials.</li> </ul>	<p><b>Evaluation method</b></p> <p>Lab exercises In class assignments Written tests</p>
<p><b>Learner outcome</b></p> <ul style="list-style-type: none"> <li>Demonstrate ability to identify parts that require heat treatment and the processes necessary to perform the operation.</li> </ul>	<p><b>Evaluation method</b></p> <p>Lab exercises In class assignments Written tests</p>
<p><b>Learner outcome</b></p> <ul style="list-style-type: none"> <li>Demonstrate the knowledge to determine proper material selection and grinding allowances prior to machining and heat treatment of parts.</li> </ul>	<p><b>Evaluation method</b></p> <p>Lab exercises In class assignments Written tests</p>
<p><b>Learner outcome</b></p> <ul style="list-style-type: none"> <li>Demonstrate the ability to heat-treat parts to print specifications and check the hardness attained.</li> </ul>	<p><b>Evaluation method</b></p> <p>Lab exercises In class assignments Written tests</p>
<p><b>Learner outcome</b></p> <ul style="list-style-type: none"> <li>Demonstrate the ability to select proper grinding wheels</li> <li>Demonstrate the ability to properly operate the surface grinder</li> </ul>	<p><b>Evaluation method</b></p> <p>Lab exercises In class assignments Written tests</p>

**VIII. Over 90% of students will successfully complete this class.**