COURSE OUTLINE

Course Number                                      Course Title          Credits
MET124                                           Machine Shop Techniques II   3

Hours: Lecture.lab                                Pre-requisite        Implementation
2/3                                              MET123               F/2017

COURSE DESCRIPTION

Introduces the theory and practical concepts of manual machining, primarily focused on using the vertical mill for milling operations to manufacture flat or angled part assemblies. Topics include shop mathematics, machine tool safety practices, measuring devices, and an understanding of vertical mill components. Corresponding labs reinforce lectures with practical hands-on examples which follow NIMS certification requirements.

Required Text: Precision Machining Technology 2nd Edition
By Peter J. Hoffman and Eric S. Hopewell
Publisher: Delmar/Cengage Learning
ISBN-9781285444543

Optional Machinery’s Handbook
By Erik Oberg and Franklin D. Jones
Publisher: Industrial Press

Revision date: 4/4/2017

Course Coordinator: D.T.DeFino  3456, definod@mccc.edu
General Objectives
Course Competencies/Goals

Students will be able to:

1. Properly demonstrate safe operation of vertical mill. (GEKG 1, 4 / CS A, B, F)
2. Become familiar with industry reference materials used for machining calculations. (GEKG 2, 4 / CS A, B, D)
3. Demonstrate proper work holding setups based on various milling operations. (GEKG 1, 2, 4 / CS A, B, D)
4. Perform basic machining operations that include facing, drilling and peripheral milling. (GEKG 1, 2, 4 / CS A, B, D)
5. Perform advanced machining operations that include pockets and slotting. (GEKG 1, 2, 4 / CS A, B, D)
6. Learn and follow proper shop safety practices and policies. (GEKG 1 / CS A, B, D, F)

General Education Knowledge Goals [ GEKG ]

Goal 1. Communication. Students will communicate effectively in both speech and writing.

Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

MCCC Core Skills [ CS ]

Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.

Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.

Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.

Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.
Unit Objectives

Unit I - Introduction to Vertical Mill Components
The student will be able to:

1. Identify all major vertical mill components. (CG 1)
2. Understand proper safety guidelines when using industrial power tools. (CG 6)
3. Identify and understand the operational control components of a vertical mill. (CG 1)
4. Determine cutter limitations using industry reference materials. (CG 2)
5. Perform speed and feed rate adjustments using vertical mill controls. (CG 1, 2)
6. Become familiar with various work holding methods used on vertical mills. (CG 1, 3)
7. Understand differences between facing, drilling and peripheral operations. (CG 1, 4)

Unit II - Basic Vertical Mill Machining Operations
The student will be able to:

1. Demonstrate proper work holding setup for peripheral operation. (CG 3, 4)
2. Demonstrate proper work holding setup for facing operation. (CG 3, 4)
3. Become familiar with the differences between conventional and climb milling. (CG 1, 4)
4. Properly use edge finder to locate part x-y reference point. (CG 2, 4)
5. Calculate proper speed and feed rate using reference manual for material being machined. (CG 2, 4)
6. Identify different tool holders used for milling operations. (CG 4)
7. Perform drilling operation on a vertical mill. (CG 3, 4)
8. Properly use digital readout (DRO) to determine desired machining dimensions. (CG 2, 4)
9. Become familiar with proper required coolants based on material. (CG 4, 6)

Unit III Advanced Vertical Mill Machining Operations
The student will be able to:

1. Demonstrate proper procedure to correctly tram a vertical mill. (CG 3, 4)
2. Perform proper procedure for squaring a piece of material. (CG 3, 4)
3. Perform proper setup for creating counterbores and countersinks. (CG 3, 5)
4. Demonstrate proper work holding setup required for slotting operation. (CG 3, 5)
5. Calculate proper speed and feed rate for slotting operation. (CG 2, 5)
6. Demonstrate proper work holding setup required for pocket operation. (CG 3, 5)
7. Calculate proper speed and feed rate for pocket operation. (CG 2, 5)
**Method of Instruction**

Learning will take place via classroom instruction, lab demonstrations, and student activities, as well as through textbook reading and homework assignments. Lab activities will augment this. Use of equipment and manual skills will be developed in the lab.

**Student Evaluation**

Students’ achievement of the course objectives will be evaluated through the use of the following:

- Three unit tests assessing students’ comprehension of terminology, calculations and practices related to the unit objectives. (GO 2 and 3)
- Lab grade based on shop projects and lab assignment results. (GO 1, 4, 5 and 6)
- In class participation, homework assignments and attendance. (GO 1, 2 and 3)

<table>
<thead>
<tr>
<th>Evaluation Tools</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Unit Tests</td>
<td>50%</td>
</tr>
<tr>
<td>Lab Assignments / Shop Projects</td>
<td>25%</td>
</tr>
<tr>
<td>Homework / In-Class Assignments</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Academic Integrity**

Students are required to perform all the work specified by the faculty and are responsible for the content and integrity of all academic work submitted, such as papers, reports, and examinations. A student will be guilty of violating the Rule of Academic Integrity if he or she:

- Knowingly represents the work of others as his or her own;
- Uses or obtains unauthorized assistance in any academic work;
- Gives fraudulent assistance to another student.
- Intentionally damages any contents of the lab or classroom
- Is found to have stolen anything from the lab or classroom

**Penalty**

- First violation for stealing or damaging is F in the course.
- First violation on test or project is an “F” grade for the test or project.
- Second violation is “F” in the course.

**Special Accommodations**

Any student in this class who has special needs because of a disability is entitled to receive
accommodations. Eligible students at Mercer County Community college are assured services under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973. If you believe you are eligible for services, please contact Arlene Stinson, the Director of Academic Support Services at her office in LB 221 or at the office telephone number which is (609) 570-3525