COURSE OUTLINE

Course Number
AMT 101

Course Title
Machine shop techniques I

Credits
3

Hours: Lecture. lab
2/3

Co-or Pre-requisite
none

Implentation
F/2019

COURSE DESCRIPTION

Introduces students to manufacturing careers, shop safety, manufacturing operations. Topics include: shop safety, mechanical hardware and shop tools, sawing, grinding, layout, hole making and thread cutting. Corresponding labs reinforce lectures with practical examples

Required Text: Machine Tool Practices
By Richard Kibbe
Publisher: Pearson

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

Revision date: 4/4/2019

Course Instructor: Michael Hanna
Ext. 3828,
hannam@mccc.edu
Office Hours: Thursday 3pm – 5:30 pm or by appointment

General Objectives
Course Competencies/Goals

Students will be able to:
1. Become familiar with industry reference materials for material compositions and machining calculations.
2. Identify common shop hazards and use common shop safety equipment
3. Become familiar with commonly used machine tools and cutting bits.
4. Safely operate and arbor press to install and remove bushings, ball bearings and shaft keys
5. Identify different vises and use them properly
6. Identify the correct tool (Hacksaws, files, hand reamer. Taps, thread cutting dies) for a given job and determine the correct use of a certain tool.
7. Identify common methods of measurement conversion and convert inch dimensions to metric
8. Identify various kinds of semi-precision/precision measuring tools and use them in typical machine shop measurements
9. Layout a workpiece to a tolerance of +1/64 inch
10. Properly use reciprocating, horizontal and vertical band machines in cutoff operations.
11. Properly choose cutting speeds and feeds and follow proper procedures for drilling

**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 – Induction and Shop Safety
The student will be able to:
1. Identify common industrial safety issues and hazards
2. Select and use personal machine shop safety equipment

Unit II – Hand tools
The student will be able to:
1. Install and remove a bronze bushing, ball bearing, shaft key using an arbor press
2. Identify various types of vises, their uses and their maintenance
3. Identify the proper tools for a given job
4. Determine the correct use of a selected tool
5. Identify, select and use hand hacksaws.
6. Identify eight common files and some of their uses.
7. Identify at least five types of hand reamers
8. Hand ream a hole to a specific size
9. Select the correct tap drill for a specific percentage of thread
10. Determine the cutting speed for a given work material-tool combination
11. Tap holes by hand or with drill press
12. Identify dies used for and threading and cut threads with a die

Unit III – Dimensional Measurement and Layout
The student will be able to:
1. Identify common methods of measurement conversion.
2. Convert inch dimensions to metric equivalents and convert metric measurements to inch equivalents.
3. Identify various kinds of rules and their applications
4. Apply rules in typical machine shop measurements
5. Measure and record to an accuracy of plus or minus .001 inch with a Vernier calipers.
6. Measure and record dimensions using outside micrometers to an accuracy of +.001 in. using outside micrometers.
7. Define comparison measurement and identify common comparison measuring tools
8. Wring gage blocks together correctly and disassemble gage block combinations and prepare the blocks properly for storage.
9. Identify common angular measuring tools read and record angular measurements using a Vernier protractor
10. Prepare the workpiece for layout and measure for and scribe layout lines on the workpiece outlining the various features.
11. Locate and establish hole centers using a layout prick punch and center punch.
12. Layout a workpiece to a tolerance of +1/64 inch

Unit IV – Sawing machines
1. Identify abrasive and cold saws abrasive wheel materials
2. Describe the operation of abrasive cold sawing machines
3. Operate the band machine controls.
4. Perform typical sawing operations on the vertical band machine.
Unit V – Drill Press
1. Identify three basic drill press types and explain their differences and primary uses.
2. Properly choose cutting speeds and feeds
3. Use proper procedures for drilling
4. Use proper work holding techniques
5. Operate the drill press safely
6. Identify tools for countersinking and counterboring.
7. Select speeds and feeds for countersinking and counterboring.

Method of Instruction
Learning will take place via classroom instruction, 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.
- Lab grade based on shop projects and lab assignment results.
- In class participation, homework and attendance.

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