MOHAWK VALLEY COMMUNITY COLLEGE UTICA AND ROME, NEW YORK

COURSE OUTLINE

MACHINING FUNDAMENTALS MT141

1. CATALOG DESCRIPTION:

MT141 Machining Fundamentals C-2, P-4, Cr-4

This course introduces the theory and practices of metal removal as applied in industry. The set-up and safe operation of conventional machine tools is stressed, along with their capabilities and limitations. Common processes such as drilling, grinding, milling, threading, and turning are utilized. Topics include speeds and feeds, metal cutting theory, cutting fluids, selection of tooling, fixturing, precision measurement, and layout procedures.

Prerequisite: MT140 Drafting and Design Using AutoCad

MA105 Technical Math 1 or MA 121 Fundamentals of College Math

1. MATERIALS:

Industrial Safety Glasses (or Goggles)

1. STUDENT LEARNING OUTCOMES:
   1. The student will demonstrate the safety procedures required to use both machine tools and hand tools.(a)
   2. The student will demonstrate the ability to complete a manual machining Project and inspect to blueprint specifications. (b)
   3. The student will demonstrate the understanding of engineering tolerances. (b)
   4. The student will demonstrate the ability to calculate dimensional measurement. (a)
   5. The student will demonstrate how to use dial calipers, micrometers, height gages, and indicators for inspection purposes. (a)
   6. The student will demonstrate the understanding of calculating cutting speeds and feed rates. (b)
   7. The student will demonstrate the difference of working with ferrous and non- ferrous materials. (b)
   8. The student will demonstrate the selection of tooling for different types of machining operations. (a)
   9. The student will demonstrate work piece setups and operation on manual machines (lathes, mills, surface grinder, bandsaws, drill press, arbor press, shaper, Turret drill press and etc.). (a)
2. MAJOR TOPICS

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| Wk | Major Topics | Lab |
| 1 | Course Outline  Safety & Job Planning | Lab Introduction Safety |
|  | Intro. to Machine Tools Cutting Speeds & Feeds | Basic Measurement |
|  | Metal Cutting Saws Types of metal saw  Band Saw Operations | Operations - Setup Safety Concerns  Deburring operations |
| 2-3 | Metrology  Basic Measurement Devices Micrometers  Vernier Calipers, Comparison Gages Gage Blocks  Angular Measurement CMM | Measurement & Gaging Sawing Operations & Deburring  Facing Operations: Mill / Lathe  Tool Grinding Safety Concerns |
|  | Layout Tools & Procedures Hand & Bench Tools Bench work | Introduction Engine Lathe Work – Tool Holders Setup & Operation |
| 4-5 | Metal Cutting Theory | Knurling & Grooving |

Metal Cutting physics OD Turning

Machinability Tool Sharpening Tooling Material Safety Concerns

Tool Geometry

Tool Wear Cutting Fluids

6-7 The Engine Lathe Grooving

Lathe Components Threading

HSS Tooling Taper Turning

Accessories Operations - Setups Work / Tool Holders Safety Concerns Speeds & Feeds

Standard Machining Operations

8-9 Safety Review

Milling Machines: Face Milling Milling Machines types Slotting

Accessories Form Cutting

Milling Cutters Peripheral Milling Milling Operations Machine Setups Standard Operations Operations - Setup

Tool – Work Holders Safety Concerns

Indexing / Dividing Heads Sine Bar Setup Special Milling operations

10-11 Drilling Machines Layout, Spot Drilling

Drill Press Standard – Deep Hole Drill Types of Tooling Tapping & Reaming Accessories Reaming

Cutting Speeds / Feeds Operations - Setup

Drill Operations Safety Concerns Typical Operations

Bolt Circles / Calculations Hole depth calculations

The Jig Bore Layout

Boring machines Pilot Drilling

Boring operations – setups Boring Head setup

12-13 Grinding Surface Grinding Setup

Types of Abrasives Operations - Setup Surface Grinders Safety Concerns

Accessories

Cylindrical Grinders

Universal Cutter & Tool Grinder Surface finish Symbols

15 Computer Age Machining CNC Mill Demo Numerical Control Basics CNC Lathe Demo

CNC 2-Axis Mill Setup / Operations CNC Turning Center Safety Concerns

Basic G & M Coding

Special Processes Make-up Lab

Electro-Chemical Milling EDM Demo Electrical Discharge Machining

Laser Machining

**COURSE NAME: MT141 MACHINING FUNDAMENTALS**

**DATE FACULTY NAME CHANGE INPUT MEASUREMENT ASSESSMENT ACTION**

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| **1/4/201** | **R.C. Decker** | **Eliminated header,** | **Middle States and** | **POAR** |  |  |
| **1** |  | **disability statement,** | **IAC and faculty** |  |
|  |  | **and grading policies** | **recommendations** |  |
|  |  | **per Middle States,** |  |  |
|  |  | **modified pre-requisites** |  |  |
|  |  | **per faculty/IAC** |  |  |
|  |  | **recommendations, and** |  |  |
|  |  | **modified student** |  |  |
|  |  | **learning outcomes** |  |  |
| **9/22/20** | **Bryan Algiuire** | **Updated Prerequisite** |  |  |  |  |
| **14** |  | **and Learning** |
|  |  | **outcomes** |
| **4/30/15** | **B. Fuller** | **Edited format** |  |  |  |  |
| **4/19/17** | **N. Roscup** | **Edited format** |  |  |  |  |
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