South Central College

MTT 1140 Measurement, Materials and Safety Level I

Course Outcome Summary

Course Information

Description
This course provides an exploration of the basics in machining, raw materials, use of hand tools, safety and maintenance. Topics include an overview of measurement techniques, materials, safety, machine tool math, quality control and maintenance. Teamwork, critical thinking and problem solving are emphasized. Hands-on experience and practical applications are included. (Prerequisite: Declare MTT as a major)

Total Credits 3
Total Hours 80

Types of Instruction

Instruction Type Credits/Hours
Lec 1/16
Lab 2/64

Pre/Corequisites
Declare MTT as a major.

Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Explore Shop Floor Layout
   Learning Objectives
   Explain General Shop Layout
   Differentiate Conventional Machinist, Programmer, Computer Numerical Control (CNC) Machinist
   Apply Housekeeping Standard
   Demonstrate Mechanical Aptitude

2. Identify Safety
3. **Explain Types of Machines**

   Learning Objectives
   Demonstrate Safety Practices
   Explain Personal Protective Equipment (PPE)
   Apply Lockout/Tagout Procedure
   Use Guards and Barriers

4. **Apply Measurement Systems and Machine Tool Math**

   Learning Objectives
   Explain the English System
   Explain the Metric System
   Apply Fractional Operations
   Use Basic Geometry, Trigonometry and Ratios
   Demonstrate Fractional/Decimal Conversions
   Recognize Tolerances on a Print
   Explain Numbering Found on a Print (Tenths, 150 millionths, etc.)
   Articulate Numbering Systems Found on Prints (Tenths, Millionths, etc.)

5. **Define Major Machine Tools**

   Learning Objectives
   Use Drill Press
   Demonstrate Sawing Machine
   Explain Machine Differences
   Differentiate Hand Tools
   Identify Lathe, Mill and Various "Axes"
   Learn the Names and to Identify Types of Drills, Mills and Insert Tooling

6. **Utilize Semi-Precision Measurement Tools**

   Learning Objectives
   Explain Key Measurement Terms
   Demonstrate Calipers Use
   Use Adjustable Squares
   Apply Angular Measurements
   Demonstrate Fixed Gage Applications

7. **Utilize Precision Measurement Hand Tools**

   Learning Objectives
   Explain Precision Measurement
   Use Precision Fixed Gages
   Demonstrate Surface Plates
   Characterize Vernier Measuring Tools
   Use Micrometers

8. **Learn Special Measurement Tools**

   Learning Objectives
   Identify Coordinate Measuring Machine
   Define Optical Comparator Operation
   Explain Toolmaker's Microscope

9. **Apply Quality Assurance Planning**
Learning Objectives
Apply Quality Practices
Compare Inspection and Preventative Processes
Calculate Average, Standard Deviation and Determine Capability Range (Average +/- 3 Standard Deviations)
Develop Sampling Plan
Create Inspection Plan
Define Differences Between Attributes and Variables (Surface Finish/Appearance vs. Measurable)

10. **Differentiate Raw Material Composition**
   Learning Objectives
   Explain Ferrous Metals
   Explain Nonferrous Metals
   Define Tempering
   Describe Heat Treatment Process
   Characterize Hardness Scales and Test Variety of Specimens

11. **Adopt Maintenance Schedules**
   Learning Objectives
   Communicate Lubrication Needs
   Use Cutting Fluids
   Demonstrate Measuring of Cutting Fluid Techniques
   Explain Methods of Application

12. **Categorize Heat Treatment of Metals**
   Learning Objectives
   Distinguish Direct, Surface and Case Hardening
   Distinguish Tempering, Anodizing and Normalizing
   Analyze Hardness Scales and Testing

**SCC Accessibility Statement**
South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-7222.

Additional information and forms can be found at: [www.southcentral.edu/disability](http://www.southcentral.edu/disability)

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