# Machine Tool Technology Course No. 13203 Credit: 1.0

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| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes:Manufacturing (48.0000) - Production Strand

Course Description: A comprehensive, **technical level** course designed to provide students with experience in the basic theories, equipment and skills needed to perform machining skills. Machine tool safety and shop math will be emphasized throughout the course.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 1: Safety

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Explain the importance of developing safe work habits. |  |
| 1.2 | Apply safe work practices when operating machinery. |  |
| 1.3 | List the personal protective equipment (PPE) required for different machining operations and when using chemicals and fluids. |  |
| 1.4 | List shop safety hazards and how to correct them. |  |

## Benchmark 2: Print Reading and Measurement

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Identify the use of specialty measuring tools (eg. caliper, micrometer, dept gauge, etc.). |  |
| 2.2 | Explain the information found on a typical mechanical drawing. |  |
| 2.3 | Explain the basics of geometric dimensioning and tolerance. |  |
| 2.4 | Identify dimensions and symbols . |  |
| 2.5 | Read and interpret sketches and print drawings. |  |
| 2.6 | Perform bench work set up. |  |
| 2.7 | Explain why layouts are needed. |  |
| 2.8 | Identify common layout tools. |  |
| 2.9 | Describe the various transfer gauges found in a machine shop. |  |
| 2.10 | Explain geometry and basic algebra formulas as they apply to machining. |  |
| 2.11 | Demonstrate the use of Metric and Standard units of measurement (e.g. measure to 1/64 of an inch with a steel rule; measure to .003 of an inch using a Dial Caliper and micrometer depth gauge; measure angles to .5 of a degree using a shop protractor). |  |
| 2.12 | Perform basic layout operations. |  |
| 2.13 | Explain a machining sequence plan. |  |
| 2.14 | Demonstrate work process planning. |  |
| 2.15 | Identify feeds and speeds for machining. |  |
| 2.16 | Identify materials used in machining. |  |
| 2.17 | Determine applications for the use of various materials. |  |
| 2.18 | Establish material preparation. |  |

## Benchmark 3: Tools and Equipment Operations

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Identify the most commonly used machine shop hand tools. |  |
| 3.2 | Identify several types of fasteners. |  |
| 3.3 | Select the proper fastening technique for a specific job. |  |
| 3.4 | Demonstrate the proper and safe use of hand tools.(eg. Files, taps, dies, etc). |  |
| 3.5 | Describe basic care and utilization of different dial indicators. |  |
| 3.6 | Operate power tools and equipment (eg. Grinder, drill, mill, lathe). |  |
| 3.7 | Identify tap and drill sizes. |  |
| 3.8 | Cut threads with taps and dies. |  |
| 3.9 | Perform a grinding operation. |  |
| 3.10 | List the proper blade for a given job. |  |

## Benchmark 4: Lathe and Milling Operations

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Identify the various parts of a lathe. |  |
| 4.2 | Calculate cutting speeds and feeds for various sizes and types of materials. |  |
| 4.3 | Describe how a taper is turned on a lathe. |  |
| 4.4 | Demonstrate the ability to safely set up and operate manual lathes, and manual milling machines. |  |
| 4.5 | Perform drilling, boring and knurling operations on a lathe.  |  |
| 4.6 | Identify the various parts of a mill. |  |
| 4.7 | Select the proper cutter for the job. |  |
| 4.8 | Explain the various work-holding devices used on a milling machine. |  |
| 4.9 | Demonstrate the ability to set-up and perform various cutting, drilling and boring operations on a milling machine. |  |
| 4.10 | Calculate proper feed and speeds in milling and turning . |  |
| 4.11 | Perform advanced techniques in lathe operation (e.g. thread cutting, tapering, etc.). |  |
| 4.12 | Perform advanced techniques in milling operation (e.g. cutting pocket, island). |  |

## Benchmark 5: Machining Setup, Layout, and Processes

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Apply the post process treatments for materials. |  |
| 5.2 | Determine and demonstrate work process planning for manufacturing. |  |
| 5.3 | Apply the use of CAM (Computer Aided Manufacturing) in machining processes. |  |
| 5.4 | Identify CNC lathe and mill fundamentals. |  |
| 5.5 | Use CNC equipment to perform milling or lathe operations. |  |

## Benchmark 6: Inspection and Quality Control

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Use precision measuring equipment during inspection procedures (e.g. micrometers, calipers, depth and bore gauges). |  |
| 6.2 | Apply quality control specifications to Inspection of parts. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

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