

# MACHINE TOOL TECHNOLOGY (MTT)

## MTT 101 # - Introduction to Machine Shop **Units: 3**

Introduces safety procedures, use of bench tools, layout tools, power saws, drill presses, precision measurement tools, rotary tables and indexing devices, lathe and mill cutting tools and tool holding, work holding and machining applications as well as the various hand tools related to the machine shop.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: All Semesters*

## MTT 105 # - Machine Shop I **Units: 3**

Introduces basic lathe applications which will consist of identifying lathe components and controls, understanding turning safety, calculating speeds and feeds, using various tools and tool holders, identifying basic tool geometry, and the use of common lathe tooling. Students will perform basic lathe operations, which will consist of facing, turning, and drilling. Students will be required to produce specified parts to a tolerance of +/- .004 in. and perform competencies set by manufacturing standards.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Enrollment Requirements: Prerequisite or Corequisite: MTT 101*

*Term Offered: All Semesters*

## MTT 110 # - Machine Shop II **Units: 3**

This course is a continuation of MTT 105 and teaches students to prepare single point external and internal unified screw threads, generate angles with the compound rest within one degree, ream holes concentric within .001 inches, determine cutting speeds, and perform facing, grooving, part-off, and tuning operations.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Enrollment Requirements: Prerequisite or Corequisite: MTT 105*

*Term Offered: All Semesters*

## MTT 140 # - Inspection Techniques **Units: 3**

Exposes the student to the principles of dimensional metrology and explores Geometric Dimensioning and Tolerancing (GD&T) concepts and applications. Students will learn how to use common measuring instruments relating to state-of-the-art manufacturing environments. Students will also learn the importance of Quality Control, TQM, and SPC processes as they relate to manufacturing environments.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: All Semesters*

## MTT 145 # - Lean Manufacturing Systems **Units: 3**

This course explores Lean Manufacturing principles, practices, and techniques from a technical standpoint with an emphasis on the frontline worker's perspective. Topics include waste definition and minimization, value stream analysis, continuous process improvement, and workplace design.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: All Semesters*

## MTT 150 # - Metallurgy I **Units: 3-4**

Offers a study of metallurgical properties in an effort to understand both the behavior of metals and their service to industry. Characteristics during heating, cooling, shaping, forming, and the stresses related to their mechanical properties are covered. The theory behind the alloys, heat treatment processes, and the impact they have on strength, toughness, hardness, elasticity, ductility, malleability, wear resistance and fatigue resistance is investigated. This course fulfills the natural sciences degree requirement for nontransferable AAS degrees only.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: All Semesters*

## MTT 198 # - Special Topics in Manufacturing **Units: 1-6**

This course introduces and discusses special topics related to Manufacturing Technology.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: AS NEEDED*

## MTT 230 # - Computer Numerical Control I **Units: 4**

Covers computer numerical control (CNC) lathe operations, program format, and machine setup. G & M codes, control functions, the letter address system, and math issues related to CNC are included. This course satisfies 7.5 hours of instruction toward completing the embedded human relations curriculum requirements, in accordance with Embedded Curriculum Guidelines Option A. This course satisfies 8 hours of instruction toward completing the embedded mathematics curriculum requirements, in accordance with Embedded Curriculum Guidelines Option A.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: Fall*

## MTT 232 # - Computer Numerical Control II **Units: 4**

Covers computer numerical control (CNC) milling operations, program format, and machine setup. G & M codes, control functions, the letter address system, and math issues related to CNC are included. Students will program, set-up and produce a variety of CNC milling projects. This course satisfies 7.5 hours of instruction toward completing the embedded human relations curriculum requirements, in accordance with Embedded Curriculum Guidelines Option A. This course satisfies 8 hours of instruction toward completing the embedded mathematics curriculum requirements, in accordance with Embedded Curriculum Guidelines Option A.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: Spring*

## MTT 234 # - Computer Numerical Control III **Units: 4**

This course covers the advanced programming concepts related to CNC Mill/Turning centers and synchronized fourth axis mills. Mill/Turn and fourth axis topics include program format, machine set-up, related G & M codes, live tooling, and indexing devices. Students will program, set-up, and produce a variety of precision machined projects.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Enrollment Requirements: Prerequisite: MTT 230, MTT 232, and MTT 293*

*Term Offered: AS NEEDED*

**MTT 250 # - Machine Shop III****Units: 3**

Introduces basic milling machine applications which will consist of identifying mill components and controls, understanding milling safety, calculating speeds and feeds, using various tools and tool holders, identifying basic tool geometry, and the use of common milling machine tooling. Students will perform basic milling operations consisting of facing, squaring, slotting, and drilling. Students will be required to produce specified parts to a tolerance of +/- .004 in. and perform competencies set by manufacturing standards.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: All Semesters*

**MTT 260 # - Machine Shop IV****Units: 3**

This is a continuation of MTT 250 and prepares students to determine hole locations by coordinates and degrees, use a rotary table, boring head, form tools, angle work, and work within +/- .001 inch tolerance.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Enrollment Requirements: Prerequisite: MTT 250. Course may be taken concurrently with MTT 250.*

*Term Offered: All Semesters*

**MTT 261 # - Machine Projects****Units: 1-6**

This course allows for further development of existing manual machining skills with hands-on instruction related to the design and production of components on manually operated machine tools. Students will plan, set-up, and produce a variety of precision machined projects.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Enrollment Requirements: Prerequisite: MTT 105 or MTT 110 or concurrent enrollment in either of these courses.*

*Term Offered: All Semesters*

**MTT 291 # - CNC Practice****Units: 1-6**

This course allows for the further development of computer aided manufacturing and/or CNC skills with hands-on instruction related to the design and production of machined parts using CAD/CAM software, CNC milling machines, and CNC turning centers. Students will plan, program, set-up, and produce a variety of precision machined projects.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Enrollment Requirements: Prerequisite: MTT 230 or MTT 232 or MTT 234 or MTT 292 or MTT 293 or concurrent enrollment with any of these courses.*

*Term Offered: All Semesters*

**MTT 292 # - Computer-Aided Manufacturing I****Units: 4**

This course provides the student with the essential concepts and techniques that are required for successful creation of two-dimensional part geometry, generation and verification of 2 1/2 axis toolpath models, as well as post processing of 2 1/2 axis NC codes within a computer-aided manufacturing (CAM) system. Students are required to produce a variety of lab exercises on robotic (CNC) machinery utilizing multi-tool programs. Coursework will primarily focus on 2D geometry projects. Basic understanding of milling machine operations is recommended. This course satisfies 8 hours of instruction toward completing the embedded mathematics curriculum requirements, in accordance with Embedded Curriculum Guidelines Option A.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Term Offered: Fall*

**MTT 293 # - Computer-Aided Manufacturing II****Units: 4**

This course is a continuation of MTT 292 with the addition of simultaneous three axis motion control and provides the student with the essential concepts and techniques that are required for successful creation of three-dimensional part geometry, solids, and surfacing, generation and verification of three axis tool path models, as well as, post processing of three axis NC codes within a computer-aided manufacturing (CAM) system. Requires students to produce a variety of lab exercises on robotic (CNC) machinery utilizing multi-tool programs. A familiarity with Mastercam, CNC programming techniques, and CNC operations is recommended.

*Transferability: May not transfer towards an NSHE bachelor's degree*

*Enrollment Requirements: Prerequisite: MTT 292 or instructor approval.*

*Term Offered: Spring*