

MACHINE TOOL TECHNOLOGY (MTT)

MTT 100 2.0 UNITS

Machine Tool Introduction

Class Hours: 1.0 Lecture / 3.0 Laboratory

Total Contact Hours: 18 Lecture / 54 Laboratory

This course is designed as a survey of machine tool technology. It introduces traditional and contemporary machining methodologies and equipment, including set-up and operation of the sawing machine, engine lathe, milling machine, abrasive machine, additive machine, laser cutter engraver and automation equipment. It will also incorporate calculation and setup of speeds and feeds, and precision measurements. This course is required for all Machine Tool Technology majors.

Transfer Credit: CSU

MTT 110 3.0 UNITS

Mechanical Maintenance of Machine Tools

Class Hours: 2.0 Lecture / 3.0 Laboratory

Total Contact Hours: 36 Lecture / 54 Laboratory

This is a survey class that will introduce students to the fundamentals and principles of mechanical maintenance of machine tools. Basics of electronic, electrical, pneumatic, and hydraulic principles will be included. The design and understanding of simple mechanical systems typically used in machine construction will be included.

Transfer Credit: CSU

MTT 111 3.0 UNITS

Programmable Logic Controllers In Automated Manufacturing

Class Hours: 2.0 Lecture / 3.0 Laboratory

Total Contact Hours: 36 Lecture / 54 Laboratory

This course will introduce students to the application of programmable logic controllers (PLCs) in automated manufacturing. The focus of this class will be on acquiring knowledge about selection, acquisition, implementation and integration of PLCs. Students will learn basic programming of PLCs and associated Human Machine Interfaces (HMIs) to gain further understanding of PLCs operations. Students will also learn about integration of input and output devices such as sensors, indicators, HMI panels, and switches.

Transfer Credit: CSU

MTT 112 3.0 UNITS

Variable Frequency Drives in Automated Manufacturing

Class Hours: 2.0 Lecture / 3.0 Laboratory

Total Contact Hours: 36 Lecture / 54 Laboratory

This course will introduce students to variable frequency drives used in automated manufacturing. Students will learn about operator panel functions, human machine interfaces (HMIs) integration and basic programming parameters in programmable logic controllers (PLCs) with the emphasis on inputs, outputs, and control parameters.

Transfer Credit: CSU

MTT 113 3.0 UNITS

Electrical Maintenance of Machine Tools

Class Hours: 2.0 Lecture / 3.0 Laboratory

Total Contact Hours: 36 Lecture / 54 Laboratory

This is a survey class that will introduce students to the fundamentals and principles of electrical maintenance of machine tools. Basics of electronic, electrical, motor, control, sensor components for both alternative and direct current circuits used in machine tools will be included. The design and understanding of simple electrical systems typically used in machine tool construction will be included.

Transfer Credit: CSU

MTT 120 2.0 UNITS

Fanuc Multi-Axis Robotics

Class Hours: 2.0 Lecture

Total Contact Hours: 36 Lecture

This is a survey class that will introduce the students to the fundamentals and principles of multi-axis robotics for machine tools using the Fanuc control. Basics of robot simulation, setup, operation, and troubleshooting will be included. The motion optimization and connection of simple systems typically used in machine shop cell environments will be included.

Transfer Credit: CSU

MTT 130 2.0 UNITS

Quality Practices and Measurement

Class Hours: 1.0 Lecture / 3.0 Laboratory

Total Contact Hours: 18 Lecture / 54 Laboratory

This course provides students with an introduction to metrology to validate part geometry using mechanical instruments according to industrial standards. Students will learn how to fill industrial inspection reports and understand how they fit in quality management systems. This course is not open to students who have completed a combination of both MTT 56 and ENGT 116.

Transfer Credit: CSU

MTT 131 3.0 UNITS

Geometric Tolerance Inspection using Verisurf

Class Hours: 2.0 Lecture / 3.0 Laboratory

Total Contact Hours: 36 Lecture / 54 Laboratory

Prerequisite: MTT130 or equivalent with a grade of "C" or higher or "Pass"

This course provides students with an introduction to geometric tolerancing and dimensioning (GD&T) applied to the field of coordinate metrology. Students learn how to measure various geometrical conditions, validate part geometry, and provide reports of their findings in industry standard formats using Verisurf. This course is not open to students who have completed a combination of both MTT 68 and ENGT 117.

Transfer Credit: CSU

<p>MTT 132 Fixture and Tool Building using Verisurf Class Hours: 2.0 Lecture / 3.0 Laboratory Total Contact Hours: 36 Lecture / 54 Laboratory</p> <p>Prerequisite: MTT 130 and MTT 131 or equivalent with a grade of "C" or higher or "Pass" This course introduces students to fixtures and tools used in manufacturing. It includes planning, design, and fabrication methods for fixturing in the machine shop. Students will also learn how to set tolerances, control feature projection, and apply probe compensation to various virtual models using Verisurf. This course is not open to students who have completed a combination of both MTT 62 and MTT 78. Transfer Credit: CSU</p>	<p>3.0 UNITS</p>	<p>MTT 152 Setup and Operation of CNC Milling Machines Class Hours: 2.0 Lecture / 1.5 Laboratory Total Contact Hours: 36 Lecture / 27 Laboratory</p> <p>This course instructs students in the safe and accurate setup and production operation of Computer Numerical Control (CNC) milling machines. Students will learn how to load programs, align fixtures, select offsets, select cutter radius compensation, and run first article parts Transfer Credit: CSU</p>	<p>2.5 UNITS</p>
<p>MTT 133 Applications of Metrology using Verisurf Class Hours: 2.0 Lecture / 3.0 Laboratory Total Contact Hours: 36 Lecture / 54 Laboratory</p> <p>Prerequisite: MTT 131 or MTT 132 or equivalent with a grade of "C" or higher or "Pass" This class is a survey of applications available in metrology. The lab portion gives practical experience in physical part validation, instrument setup, and reporting. Students will use both mechanical instruments and articulated coordinate measuring machines (CMM). Students will also practice best fitting of models using the Verisurf software. This course is not open to students who have completed a combination of both MTT 78 and MTT 168. Transfer Credit: CSU</p>	<p>3.0 UNITS</p>	<p>MTT 157 Setup and Operation of CNC Lathes Class Hours: 2.0 Lecture / 1.5 Laboratory Total Contact Hours: 36 Lecture / 27 Laboratory</p> <p>This course instructs students in the safe and accurate set-up and production operation of Computer Numerical Control (CNC) lathes. Students will learn how to load programs, select offset, select cutter radius compensation, and run first article parts. Transfer Credit: CSU</p>	<p>2.5 UNITS</p>
<p>MTT 140 Industrial and Machine Tool Safety Class Hours: 1.0 Lecture Total Contact Hours: 18 Lecture</p> <p>This course is designed to familiarize machine tool students with recognized safety practices of the industry. Emphasis will be placed on compliance with government safety codes and regulations. Student will be introduced to preventive health and safety techniques and practices relating to industrial environment and machine tool equipment. Transfer Credit: CSU</p>	<p>1.0 UNITS</p>	<p>MTT 180 Robotics for Computer Numerically Controlled Machines Class Hours: 2.0 Lecture / 3.0 Laboratory Total Contact Hours: 36 Lecture / 54 Laboratory</p> <p>This course introduces the student to the applications of robotics for computer numerically controlled (CNC) machines by the use of activities-based learning, project-based learning, and problem-based learning. The student will learn how to create a part using software and apply computer-generated toolpaths. The student will also learn about setup, operation, and programming of CNC machines. Techniques of integration between several CNC machines in a work cell environment will be emphasized using simulation and robotic applications. Transfer Credit: CSU</p>	<p>3.0 UNITS</p>
<p>MTT 151 Mastercam Introduction Class Hours: 3.0 Lecture / 1.5 Laboratory Total Contact Hours: 54 Lecture / 27 Laboratory</p> <p>This course will prepare students to operate the MasterCAM Programming Systems for milling and turning machines. Students will learn to create and import Computer Aided Design (CAD) geometry, create proper job plans, devise proper toolpaths, verify program accuracies with graphic simulation in a virtual Computer Numerical Control (CNC) machine. This course is not open to students who have completed a combination of both MTT 51 and MTT 59. Transfer Credit: CSU</p>	<p>3.5 UNITS</p>	<p>MTT 191L CNC Mill Machining Laboratory Class Hours: 3.0 Laboratory Total Contact Hours: 54 Laboratory</p> <p>Prerequisite: MTT 151 and MTT 152 with a grade of "C" or higher or "Pass". This course is designed to further develop specialized Computer Numerical Control (CNC) Milling Machine skills using Computer Assisted Manufacturing (CAM) software on a semi-autonomous basis. The student will receive instructions and blueprints from the instructor and work on those projects individually. The student will plan the work, select the programming method given the tolerances of the part, select the fixture, tools, and run a first article on a CNC Mill. (Formerly MTT 91L) Transfer Credit: CSU</p>	<p>1.0 UNITS</p>

<p>MTT 194L Manual Machining Lab Class Hours: 3.0 Laboratory Total Contact Hours: 54 Laboratory</p>	<p>1.0 UNITS</p>	<p>MTT 280 Setup and Operation of Multi-Axis CNC Machines Class Hours: 2.0 Lecture / 1.5 Laboratory Total Contact Hours: 36 Lecture / 27 Laboratory</p>	<p>2.5 UNITS</p>
<p>Prerequisite: MTT 100 or equivalent with grades of "C" or higher or "Pass". This course is designed to further develop skills in using manual lathes, manual mills, and associated cutting tools and machines on a semi-autonomous basis. Students will receive instructions and blueprints from the instructor and work on those projects individually to increase their skills and knowledge in specialized areas of their choice with the approval and guidance of the instructor. (Formerly MTT 94L) Transfer Credit: CSU</p>		<p>Prerequisite: MTT 152 or equivalent with a grade of "C" or higher or "Pass" Corequisite: MTT 279 or previous completion with a grade of "C" or higher or "Pass" Recommendation: MTT191L or MTT 278 with a grade of "C" or higher or "Pass".</p>	
<p>MTT 195L CNC Lathe Machining Laboratory Class Hours: 3.0 Laboratory Total Contact Hours: 54 Laboratory</p>	<p>1.0 UNITS</p>	<p>This course is designed for students to further develop specialized Computer Numerical Control (CNC) multi-axis machining skills using Computer Assisted Manufacturing (CAM) software. Students will learn to analyze blueprints and tolerances, to plan machining processes, to program, set up, and operate 4 & 5-Axis machining center and C & Y axis turning center machines to produce parts, and to perform first-article inspection. Transfer Credit: CSU</p>	
<p>Prerequisite: MTT 151 and MTT 157 with grades of "C" or higher or "Pass." This course is designed to further develop specialized Computer Numerical Control (CNC) turning machine skills using Computer-Assisted Manufacturing (CAM) software on a semi-autonomous basis. The student will receive instructions and blueprints from the instructor and work on those projects individually. The student will plan the work, select the programming method given the tolerances of the part, select the fixture, and tools, and run a first article on a CNC lathe. (Formerly MTT 95L) Transfer Credit: CSU</p>			
<p>MTT 278 Mastercam Advanced Class Hours: 3.0 Lecture / 1.5 Laboratory Total Contact Hours: 54 Lecture / 27 Laboratory</p>	<p>3.5 UNITS</p>		
<p>Prerequisite: MTT151 or equivalent with grade of "C" or higher or "Pass" This course advances the student's skill in the development of 3D surface models, solids and 3D toolpaths using MasterCAM. Students learn to create swept, ruled, revolved, Coons, draft, trimmed, and lofted surfaces using parametric and Non-Uniform Rational B-Splines (NURBS) modeling methodology. Basic and advanced solids modeling is fully incorporated into this class. Transfer Credit: CSU</p>			
<p>MTT 279 Mastercam Multi-Axis Class Hours: 3.0 Lecture / 1.5 Laboratory Total Contact Hours: 54 Lecture / 27 Laboratory</p>	<p>3.5 UNITS</p>		
<p>Prerequisite: MTT 151 or equivalent with a grade of "C" or higher or "Pass" This course is designed for students to further develop specialized skills in programming multi-axis milling and turning toolpaths using Mastercam software. Students will learn to analyze blueprints, to plan machining processes, to program 4 & 5 axis milling with curves, swarf, flow, and multi-surface toolpaths for vertical machining centers, and C & Y axis drilling and milling toolpaths for turning centers. Basic collision control strategies and rotary axis machining are fully incorporated into this class. This course is not open to students who have completed a combination of both MTT 71 and MTT 72. Transfer Credit: CSU</p>			