

Program Overview

The Machine Tooling Technics program emphasizes mold and toolmaking for the plastic injection molding industry including using computerized machining equipment. Basic machining skills are covered along with math and print reading. The student will gain skills in precision measurement, metallurgical processes, in-depth programming, operation of CNC milling machines and lathes, shop and theory courses in toolmaking, and CAD/CAM operation.

Campus:
New Richmond



Student Profile

Machine Tooling Technics students should be able to:

- Solve math problems
- Visualize shapes and forms
- Concentrate
- Be detail oriented and take criticism
- Enjoy doing mechanical work
- Lift 75 pounds
- Assume responsibility
- Follow procedures carefully
- Manage their time
- Work well with others and under supervision

Preparation for Admission

Students should strive to reach a comfort level in the following courses or skills:

- Communications
- General Metals/Welding/Woodworking
- Machine Shop
- Print Reading
- Algebra/Trigonometry
- Geometry
- Keyboarding

Program Outcomes

Employers will expect the Machine Tooling Technics graduate to be able to:

- Operate machine tools such as a drill press, power saw, surface grinder, lathe, milling machine, and CNC equipment
- Interpret part prints and use engineering reference materials
- Demonstrate safe practices and techniques
- Use layout precision measurement and inspection equipment
- Create CAD drawings
- Create CAM programs
- Program, set up, and operate CNC equipment

Collegewide outcomes and indicators will also be addressed to develop personal awareness, career effectiveness, and professionalism. See page 5 for a list of collegewide outcomes and indicators.

Career Outlook

Typical careers available after graduation include:

- Tool and Die Mold Maker
- Machinist Apprentice
- Machine Operator
- CNC Machinist
- Setup Person
- Programmer
- Maintenance Machinist

Curriculum

Number	Course Title	Credits
Occupational Specific Courses		
32420306	Machine Shop Theory 1	2
32420307	Machine Shop Theory 2 ▲	2
32420308	Applied Machine Tooling 1	4
32420309	Applied Machine Tooling 2 ▲	4
32420311	Materials for Machine Tooling Technics	1
32420321	Print Reading for Machine Trades	1
32420334	CAD/CAM Demo ▲	2
32420336	Applied Machine Tooling 3 ▲	4
32420337	Applied Machine Tooling 4 ▲	4
32420338	CAD Basics ▲	1
32420339	Mastercam ▲	2
32420357	Advanced Machining Concepts	1
32420370	Machine Tooling Technics 1▲	4
32420371	Machine Tooling Technics 2 ▲	4
32420372	Machine Tooling Technics 3 (WBL) ▲	5
32420391	Toolmaking Theory	<u>2</u>
		43
Occupational Supportive/ General Studies Courses ▽		
32801361	Applied Communications 1	2
32801363	Applied Communications 2 ▲	2
32804355	Math 355	3
32804365	Math 365 ▲	3
32809371	Applied Human Relations	2
10890112	Information Resources	<u>2</u>
		14
	PROGRAM REQUIREMENTS	57

- ▲ Requires a prerequisite and/or corequisite that must be completed with a grade point of 2.0 or better.
- ▽ See page 40 for General Studies course descriptions.

Course Descriptions

(See page 40 for General Studies course descriptions)

32420306

Machine Shop Theory 1 - Credits: 2

This course provides the student with knowledge in the areas of safety, speed and feed calculations, layout equipment, cutting tools, and machine tool equipment. Also introduces and studies the more technical shop operations of threading, tapping, boring, carbide tooling, and principles of metal cutting. Principles of metal cutting include the machinability of metals and how it relates to chip formation. Students will study the makeup of carbide tooling, how carbide is affected by operating conditions, and various carbide characteristics, sizes, shapes, grades, and applications as identified by the American Standards Association. The content supports activities in Applied Machine Tooling 1 and 2.

32420307

Machine Shop Theory 2 - Credits: 2

This course is a continuation of Machine Shop Theory 1. This lecture-based course will use lecture, group work, and individual projects to introduce you to surface grinding, CNC theory, application, programming, and inspection procedures. PREREQUISITE: 32420306 Machine Shop Theory 1.

32420308

Applied Machine Tooling 1 - Credits: 4

This lab-based course will provide instruction in shop safety, measuring, print reading, and basic setup and operation of saws, mills, and lathes.

32420309

Applied Machine Tooling 2 - Credits: 4

This lab-based course will introduce the student to threading, boring, precision and taper turning, and inspection procedures using optical comparators and coordinate measuring machines. COREQUISITES: 32420308 Applied Machine Tooling 1 and 32420321 Print Reading for Machine Trades.

32420311

Materials for Machine Tooling Technics - Credits: 1

During this course students will learn the basic principles of metallurgy related to mechanical, physical, and chemical properties of materials used for Machine Tooling Technics. Materials covered will be steel, cast iron, aluminum, copper, and plastics. Lab activities will include hardening, tempering, and hardness testing. This course will give the student the ability to make material selections and perform problem solving for specific applications that they will encounter in industry.

32420321

Print Reading for Machine Trades - Credits: 1

This course will cover the basic principles of print reading. The emphasis is on interpreting standard lines and symbols in single- and multiple-view working drawings. Topics include print reading procedures, drawing changes, machining specifications, and the reading of prints in specialized areas including ANSI and ISO standards. Strongly recommend a basic understanding of mathematics concepts.

32420334

CAD/CAM Demo - Credits: 2

This course builds on CAD Basics and Mastercam with additional CAD drawing concepts and CAM projects. Learners will utilize Solidworks and Mastercam applications to complete their learning objectives. Students will gain competency in file management by saving, converting, and working with different file types. Learners will create geometry in each application and convert files between CAD and CAM. Students will apply various tool paths to the designs they have created. Surface creation and machining exercises will be demonstrated by each individual. Each learner will design and detail a plastic part including a plotted final drawing to the correct scale. PREREQUISITES: 32420321 Print Reading for Machine Trades and 32420339 Mastercam.

32420336

Applied Machine Tooling 3 - Credits: 4

Students will further build their skills in machining and develop confidence in their ability to produce good workpieces. Students will continue to use the tools and procedures introduced in Machine Shop Theory 1. Students will also be introduced to surface grinding, coordinate measuring machine inspection, optical comparator, and CNC programming, setup, and machining. PREREQUISITES: 32420306 Machine Shop Theory 1 and 32420309 Applied Machine Tooling 2.

32420337

Applied Machine Tooling 4 - Credits: 4

This lab-based course further develops students' skills in CNC vertical mill and CNC lathe setup, operation, and programming. Students will set up increasingly complex projects on both the CNC lathe and CNC vertical mill. Students will learn how to troubleshoot CNC setups, programs, and tooling variations. Students will also troubleshoot and run their own programs created in Machine Shop Theory 2 and Mastercam. Finally, students will complete surface grinding projects. COREQUISITES: 32420307 Machine Shop Theory 2 and 32420336 Applied Machine Tooling 3.

32420338

CAD Basics - Credits: 1

This course offers instruction on individual computer workstations in a computer lab. This computer-aided drafting (CAD) instruction uses SolidWorks software that is capable of creating 3D drawings. In this course you will spend a majority of the time creating 3D models and exploring the concepts of working in 3D space. Students will create complete and fully dimensioned 3-view partprints ready to be transferred to paper. COREQUISITE: 32420321 Print Reading for Machine Trades.

32420339

Mastercam - Credits: 2

This introductory course prepares students for using Computer-Aided Machining (CAM) software to create CNC machining programs. This CAM instruction utilizes Mastercam software that is capable of creating 2D and 3D wire drawings, from which toolpaths to machine part features can be generated. Students will complete a variety of exercises before working on 2D machining projects. Students will create complete CNC process projects including drawings, toolpaths, CNC code, and all setup sheets and diagrams. These projects will be shop ready for machining. PREREQUISITE: 32420338 CAD Basics.

32420357

Advanced Machining Concepts - Credits: 1

In this course students will learn about advanced CNC programming and setup techniques, electrical discharge machining, and advanced inspection techniques.

32420370

Machine Tooling Technics 1 - Credits: 4

In this course learners will learn to set up, program, and run CNC mills, lathes, and EDM equipment. Learners will continue to build competencies in surface grinding, tool and cutter grinding, and manual milling. PREREQUISITE: 32420337 Applied Machine Tooling 4.

32420371

Machine Tooling Technics 2 - Credits: 4

In this course learners will build upon their machining skills using CNC mills, lathes, and EDM equipment. Learners will continue to build competencies in surface grinding, tool and cutter grinding, and manual milling. Learners will create, program, and run CNC programs with helical interpolation, subroutines, cutter compensation, and multiple fixture offsets. Learners will practice final grinding and fitting operations. COREQUISITE: 32420370 Machine Tooling Technics 1.

32420372

Machine Tooling Technics 3 (WBL) - Credits: 5

In this course, the learner will build and polish one plastic injection mold. Learners will do several projects to gain competency, which will include electrical discharge machining, tool and cutter grinding, and a project that requires problem solving set-up problems. A work-based learning component will be completed by each individual; you will contact a manufacturer to get a job that you will bring back to the campus lab and complete the work as directed by the manufacturer and your instructor. Learners will gain additional skills in the operation of basic and advanced machine tools in the areas of milling, drilling, boring, reaming, grinding, CNC milling, and EDMing operations. PREREQUISITES: 32420321 Print Reading for Machine Trades, 32420371 Machine Tooling Technics 2, and COREQUISITE: 32420391 Toolmaking Theory.

32420391

Toolmaking Theory - Credits: 2

This course provides the classroom instruction that supports shop activities in semester four of the Machine Tooling Technics program. It is a lecture course that addresses the technology of various types of plastic injection mold dies. Major emphasis will be placed on the theory, design, and building of plastic injection molds. Small group activities will be utilized to enhance student learning.

Graduate Employment Information

(WITC Graduate Survey Responses 2008-2009; for most recent data, go to witic.edu)

Number of graduates	15	Number employed	13	% employed in WITC district	63%
Number of responses	15	Percent employed	87%	Range of yearly salary	\$25,998-\$37,437
Number available for employment	15	Employed in related field	8	Average yearly salary	\$32,757

career vision