

# Machine Tool Technician (Two-Year)

32-420-1 Technical Diploma

Financial Aid Eligible

## Program Overview

The two-year Machine Tool Technician program will prepare you to operate and set up machine tools for the machining industry. You will learn general machining skills based on the skills and knowledge identified by the Metalworking Industry Skill Standards Board. You will learn production planning and quality control and how to use metallurgical equipment, perform precision measuring, use an engineer's handbook, and interpret prints. Computer-aided machining and programming techniques are emphasized.

Offered at:



Rice Lake Superior

## Student Profile

As a Machine Tool Technician student, you should be able to:

- Solve math problems
- Visualize shapes and forms
- Problem solve
- Be detail oriented and take criticism
- Enjoy doing mechanical work
- Lift 25 pounds
- Assume responsibility
- Follow procedures carefully
- Manage your time
- Work well with others and under supervision

## Preparation for Admission

The following experiences will help you prepare for this program:

- Communications
- Mechanical Design
- General Metals/Welding
- Machine Shop
- Print Reading
- Principles of Technology
- Algebra
- Trigonometry
- Geometry
- Keyboarding
- Economics
- Physics

## Program Outcomes

Employers will expect you, as a Machine Tool Technician graduate, to be able to:

- Set up and operate machine tools such as a drill press, power saw, grinding machine, lathe, and a milling machine.
- Use appropriate prints and engineering resources.
- Demonstrate safe practices and techniques.
- Apply basic physical and mechanical properties of metals and other materials.
- Use hand-held tools.
- Use layout, precision measurement, and inspection equipment.
- Apply production control and statistical process control techniques.
- Apply general math, communications, and human relations skills.
- Utilize computer technology to solve machining problems.
- Program, set up, and operate computer-controlled machine tools.
- Work in teams.

## Career Outlook

After graduating from the two-year Machine Tool Technician program, you will be ready to start your career as a:

- Machine Tool Operator
- Apprentice Machinist
- Machine Setup Person
- Tool Room Machinist
- CNC Machinist
- Maintenance Machinist
- CNC Programmer

## Curriculum

Number	Course Title	Credits
<b>Occupational Specific Courses</b>		
32420300	Metrology	2
32420312	CNC Programming - Turning ▲	2
32420313	CNC Turning Operations ▲	2
32420315	CNC Programming - Milling ▲	2
32420316	CNC Milling Operations ▲	2
32420320	CAD/CAM Applications ▲	2
32420332	Semi-Precision Machining	2
32420351	Print Reading for Machine Trades	2
32420353	Production Planning and Quality ▲	2
32420360	Production Problems ▲	2
32420361	Introduction to CAD/CAM	1
32420362	Milling Fundamentals	2
32420363	Turning Fundamentals	3
32420365	CNC Fundamentals	2
32420366	Milling Applications ▲	3
32420367	Turning Applications ▲	3
32420373	Production Machining 1▲	5
32420374	Production Machining 2 (WBL) ▲	5
32420375	Job Shop Machining 1 ▲	4
32420376	Job Shop Machining 2 ▲	4
32420399	Precision Grinding ▲	<u>3</u>
		55
<b>Occupational Supportive/General Studies Courses</b>		
32801361	Applied Communications 1	2
32801363	Applied Communications 2 ▲	2
32804355	Math 355	3
32804364	Math 364 ▲	2
32806300	Applied Materials Science	2
32809371	Applied Human Relations	2
32890305	Applied Information Resources	<u>2</u>
		15
	<b>PROGRAM REQUIREMENTS</b>	<b>70</b>

▲ This course requires a prerequisite and/or corequisite, and must be completed with a grade of "C" or better.

# Course Descriptions

## 32420300

### Metrology - Credits: 2

This course is for the beginner. We will learn how to use semi-precision measuring tools such as, steel rules, screw thread gauges, etc. We will also learn how to use precision measuring instruments such as assorted micrometer types, go/no go plug gauges, go/no go thread gauges, assorted calipers, etc. To do this we will start out by going over the number systems (decimal and fraction). You will learn how to read and write numbers in both systems. This is a very basic course but it represents the foundation that machining rests on measurement.

## 32420312

### CNC Programming - Turning - Credits: 2

Students will learn about program structure (startup, work, shutdown), and basic G-codes including variations caused by machine type and programmer style. They will write simple programs and edit prewritten programs in order to hone their skill. The goal will be to start out simple and move to programs that are both efficient and effective. PREREQUISITE: 32420365 CNC Fundamentals or consent of instructor.

## 32420313

### CNC Turning Operations - Credits: 2

CNC turning centers produce many of the cylindrical shapes machined in production machine shops today. This course will include machine/control familiarization, machine startup procedures, program transfers, work holding preparation, tooling preparation, setting tooling offsets, and part origins. In addition, students learn how to run the first part including dry runs and making minor tool offset adjustments. PREREQUISITE: 32420365 CNC Fundamentals or consent of instructor.

## 32420315

### CNC Programming - Milling - Credits: 2

Productive users of CNC machining centers benefit from the execution of effective and efficient CNC programs. Students will become familiar with frequently used G-codes and will be exposed to special G-code cycles. They will learn how to convert drawing specifications into CNC G-code format using linear and circular interpolation functions as well as utilizing the benefits of canned cycles used for drilling, reaming, tapping, and boring holes. Programs will be entered and edited on personal computers and at the CNC mill/drill controls. PREREQUISITE: 32420365 CNC Fundamentals or consent of instructor.

## 32420316

### CNC Milling Operations - Credits: 2

CNC mills produce many of the prismatic shapes machined in production machine shops today. This course will include machine/control familiarization, machine startup procedures, program transfers, work holding preparation, tooling preparation, setting tooling offsets, and part origins. In addition, students learn how to run the first part including dry runs and making minor tool offset adjustments. PREREQUISITE: 32420365 CNC Fundamentals or consent of instructor.

## 32420320

### CAD/CAM Applications - Credits: 2

Computer-Aided Design (CAD) and Computer-Assisted Manufacturing (CAM) have become standard tools used almost wherever CNC production in metalworking takes place. Students will use the Virtual Gibbs software to build geometry, tool and material libraries, and define cutting paths/patterns. Post-processing of these CAD/CAM files will generate CNC programs in machine-specific G-code format. PREREQUISITE: 32420361 Introduction to CAD/CAM or consent of instructor.

## 32420332

### Semi-Precision Machining - Credits: 2

This course will consist of the major categories of safety, maintenance, saws, drills, and pedestal grinders. Basic theory and skills will be taught for each area. The machines and related theory are designed to address those areas that deal with semi-precision processes. This course is self-paced, learner driven. Computers are used to deliver the course material and an instructor will be available to provide assistance when necessary.

## 32420351

### Print Reading for Machine Trades - Credits: 2

This course will cover the basic principles of print reading. The emphasis will be on interpreting lines and symbols in single- and multiple-view working drawings. Topics include print reading procedures, sketching, drawing changes, machine specifications, and the reading of prints in specialized areas including ANSI, ISO standards, and geometric dimensioning and tolerancing.

## 32420353

### Production Planning and Quality - Credits: 2

This course is intended to develop the concepts of production planning for machined parts. The student will develop process plans for parts that will be machined in the Job Shop Machining class. The student will also develop a portfolio to document processes and quality assurance methods. PREREQUISITES: 32420366 Milling Applications, 32420367 Turning Applications, and 32420399 Precision Grinding.

## 32420360

### Production Problems - Credits: 2

This course will introduce the student to the elements involved in the manufacture of a product. The course will include designing and building jigs and fixtures for use on a production project. PREREQUISITES: 32420365 CNC Fundamentals, 32420366 Milling Applications, and 32420367 Turning Applications.

## 32420361

### Introduction to CAD/CAM - Credits: 1

This course will introduce students to computer-aided drafting (CAD) and computer-aided machining (CAM). Students will use appropriate CAD software to prepare mechanical drawings. Students will be introduced to CAD/CAM equipment.

## 32420362

### Milling Fundamentals - Credits: 2

This course covers the introduction to the milling machines. Emphasis is on knowing the machine parts, their function, and performing simple lathe operations. Introductory subjects such as related safety, maintenance, metal cutting theory, cutting tools, and work holding for the mill will be taught. Students will learn the basics of metal cutting on these machines so that when they get to CNC machines they can focus on the unique aspects of the computerized machine.

## 32420363

### Turning Fundamentals - Credits: 3

This course is designed to teach the beginner how to use the manual engine lathes. Students will learn about lathes, associated processes, lathe tools, and related safety/maintenance issues. This course is a prerequisite to more advanced manual lathe courses and CNC courses. Students will learn the basics of metal cutting on these machines so that when they get to CNC machines they can focus on the unique aspects of the computerized machine.

## 32420365

### CNC Fundamentals - Credits: 2

This course introduces the student to the development and editing of Computer Numerical Control (CNC) programs. The basic elements of CNC machine setup and operation are covered for the production of acceptable parts. Safety concerns are also addressed. Strongly recommend a basic understanding of algebra, geometry, and trigonometry.

## 32420366

### Milling Applications - Credits: 3

This course is designed to teach the student to use the manual milling machine to perform more difficult milling operations. Students will learn about new tools and processes. This course is a prerequisite for the CNC courses. Students will reinforce and build upon what they've learned in the basic milling class so that when they get to CNC machines they can focus on the unique aspects of the computerized machine. PREREQUISITE: 32420362 Milling Fundamentals.

## 32420367

### Turning Applications - Credits: 3

This course is designed to teach the student how to use the manual engine lathe for more advanced machining operations such as threads and tapers. Students will expand their knowledge of turning. They will learn about new tools, procedures, and about the terminology that is associated with threads and tapers. This course is a prerequisite for the CNC courses. Students will reinforce and build upon what they have learned in the basic turning course so that when they get to CNC machines they can focus on the unique aspects of the computerized machine. PREREQUISITE: 32420363 Turning Fundamentals.

## 32420373

### Production Machining 1 - Credits: 5

This course is intended to develop the advanced skills and knowledge needed for entry into a production machining environment. The student machinist will use knowledge and skills developed in previous study to solve production machining problems. Emphasis will be placed on machine elements and prototype development and testing. PREREQUISITES: 32420366 Milling Applications, 32420367 Turning Applications, and 32420399 Precision Grinding.

## 32420374

### Production Machining 2 (WBL) - Credits: 5

This course will continue to develop the advanced skills and knowledge needed for entry into a production machining environment. The student machinist will use knowledge and skills developed in previous study to solve production machining problems. Emphasis will be placed on the efficient manufacture of parts in higher quantities. This course will also serve as a work-based learning experience. PREREQUISITES: 32420366 Milling Applications, 32420367 Turning Applications, and 32420399 Precision Grinding.

## 32420375

### Job Shop Machining 1 - Credits: 4

This course is intended to develop the skills and knowledge needed in a job shop environment. The student machinist will use knowledge and skills developed in previous study to solve typical job shop problems. PREREQUISITES: 32420366 Milling Applications, 32420367 Turning Applications, and 32420399 Precision Grinding.

## 32420376

### Job Shop Machining 2 - Credits: 4

This course is intended to develop the advanced skills and knowledge needed in a job shop environment. The student machinist will use knowledge and skills developed in previous study to solve typical job shop problems. This course builds on Job Shop Machining 1 experiences and provides additional skills in cutting tool selection and material characteristics. PREREQUISITES: 32420366 Milling Applications, 32420367 Turning Applications, and 32420399 Precision Grinding.

## 32420399

### Precision Grinding - Credits: 3

This course is designed to teach the student to use grinding machines. The student will learn about general grinding machine operations. They will learn how to set up surface grinders and perform basic surface grinding operations. The outcome achieved in this course is a familiarity with the grinding processes that have broad application in industry. PREREQUISITES: 32420362 Milling Fundamentals and 32420363 Turning Fundamentals.

## Graduate Employment Information

(WITC Graduate Survey Responses 2005-2006)

Number of graduates	7	Number employed	5	% employed in WITC district	20%
Number of responses	5	Percent employed	100%	Range of yearly salary	\$29,118-\$35,357
Number available for employment	5	Employed in related field	5	Average yearly salary	\$32,279

*career vision*