

# machine tool technician

## Technical Diploma

**Program Code: 32-420-1**

**Total Credits: 54**

The Machine Tool Technician program prepares graduates for machining positions, an in-demand skill set at the heart of industrial production. Additional training and experience often lead to supervisory, quality assurance, and tool maker positions. In this program you will learn to shape various materials into intricate, precise, usable parts. You'll also work from blueprints and written specifications to select the proper machinery, materials, and tools, and you'll gain proficiency with machine tools such as lathes, mills, grinders, computers, and computerized numerical control (CNC) machines.

**Estimated tuition and fees:** [mstc.edu/programcosts](http://mstc.edu/programcosts)

### ACADEMIC ADVISOR

To schedule an appointment with an academic advisor, call 715.422.5300. Academic advisors will travel to other campuses as necessary to accommodate student needs. For more information about advising, visit [mstc.edu/advising](http://mstc.edu/advising).

### CHECKLIST:

This section will be completed when meeting with your academic advisor.

- FAFSA ([www.fafsa.gov](http://www.fafsa.gov))
- Financial Aid Form(s)  
Form(s): \_\_\_\_\_
- Follow-Up Appointment:  
Where: \_\_\_\_\_  
When: \_\_\_\_\_  
With: \_\_\_\_\_
- Official Transcripts  
Mid-State Technical College  
Student Services Assistant  
1001 Centerpoint Drive  
Stevens Point, WI 54481
- Other: \_\_\_\_\_  
\_\_\_\_\_

**mstc.edu**  
**888.575.6782**



**ADAMS CAMPUS**  
401 North Main  
Adams, WI 53910

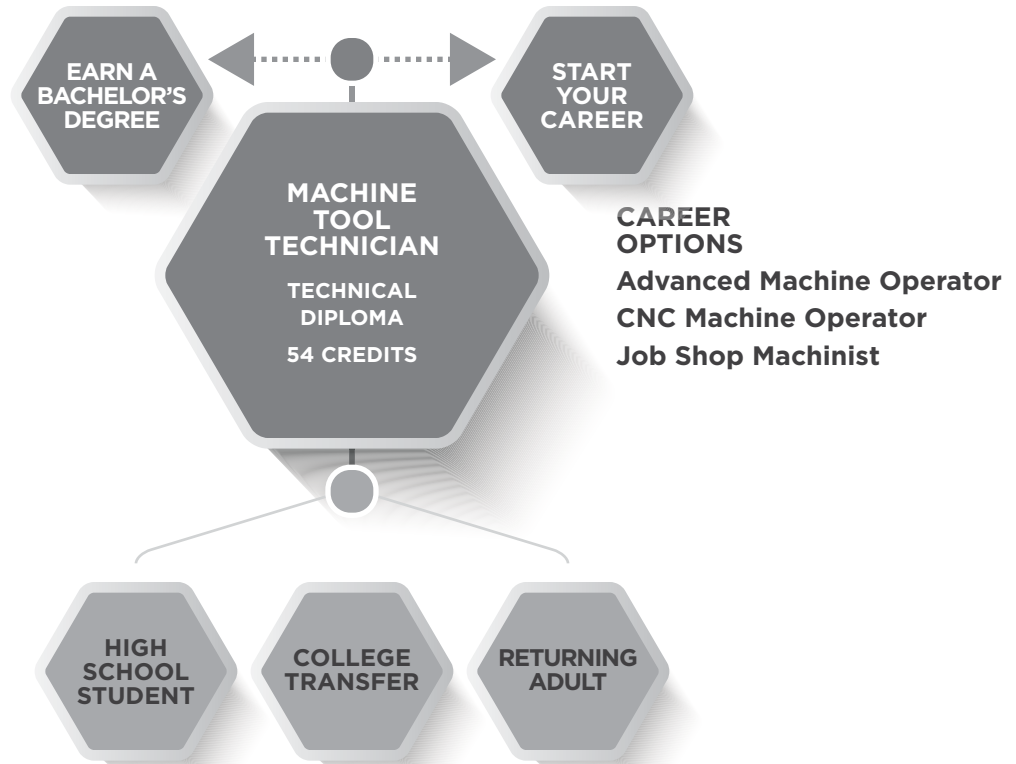
**MARSHFIELD CAMPUS**  
2600 West 5th Street  
Marshfield, WI 54449

**STEVENS POINT CAMPUS**  
1001 Centerpoint Drive  
Stevens Point, WI 54481

**WISCONSIN RAPIDS CAMPUS**  
500 32nd Street North  
Wisconsin Rapids, WI 54494

## BACHELOR'S DEGREE OPTIONS

For more information and additional opportunities, visit [mstc.edu/transfer](http://mstc.edu/transfer).



College Credit • Dual Credit • Military Experience • Work Experience  
Learn about Credit for Prior Learning at [mstc.edu/cpl](http://mstc.edu/cpl).

**BEGIN AT ANY POINT  
IN THE PATHWAY**

## OTHER OPTIONS

### RELATED PROGRAMS

- Industrial Mechanical Technician
- Stainless Steel Welding
- Welding

### APPRENTICESHIP OPPORTUNITIES

- Machinist Apprenticeship

**PROGRAM OUTCOMES**

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

- Apply basic safety practices in the machine shop.
- Interpret industrial/engineering drawings.
- Apply precision measuring methods to parts inspection.
- Perform basic machine tool equipment setup and operation.
- Perform programming, setup, and operation of CNC machine tools.
- Perform advanced CNC machining operations.

**TECHNICAL SKILLS ATTAINMENT**

The Wisconsin Technical College System (WTCS) has implemented a requirement that all technical colleges measure program outcomes attained by students. This requirement is called Technical Skills Attainment (TSA). The main objective of TSA is to ensure graduates have the technical skills needed by employers. Students are notified of TSA reporting in their final few courses of the program.

**NOTES:**

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**STUDENT HANDBOOK**

Visit [mstc.edu/studenthandbook](http://mstc.edu/studenthandbook) to view Mid-State’s student handbook, which contains information about admissions, enrollment, appeals processes, services for people with disabilities, financial aid, graduation, privacy, Mid-State’s Student Code of Conduct, and technology.

**GRADUATION REQUIREMENT**

The GPS for Student Success course is required for all Mid-State program students and is recommended to be completed before obtaining 12 credits. (Not counted in the total credit value for this program.) Some students are exempt from this requirement. Please see your program advisor for more information.

**GPS for Student Success**

**10890102 ..... 1 credit**

Integrate necessary skills for student success by developing an academic plan, identifying interpersonal attributes for success, adopting efficient and effective learning strategies, and utilizing Mid-State resources, policies, and processes. This course must be completed prior to obtaining 12 credits and as a graduation requirement.

**ADDITIONAL COURSES AS NEEDED**

The following courses may be recommended or required if the student does not achieve minimum Accuplacer scores.

**Intro to College Reading**

**10838104 .....2 credits**

Provides learners with the opportunities to develop and expand reading skills, including comprehension and vocabulary skills. Learners apply reading skills to academic tasks and read to acquire information from a variety of sources.

**Intro to College Writing**

**10831103 .....3 credits**

Introduces basic principles of composition, including organization, development, unity, and coherence in paragraphs and multi-paragraph documents. The purpose of this course is to prepare students for successful entry into required program courses. This course is tuition bearing and under certain circumstances may qualify for financial aid. This course cannot be used to satisfy program completion requirements at Mid-State.

*Prerequisite: Accuplacer Sentence Skills score of 60 or equivalent. Proficiency in word processing skills recommended.*

**Pre-Algebra**

**10834109 .....3 credits**

Provides an introduction to algebra. Includes operations on real numbers, solving linear equations, percent and proportion, and an introduction to polynomials and statistics. Prepares students for elementary algebra and subsequent algebra-related courses.

*Prerequisite: Accuplacer Math score of 65, Accuplacer Algebra score of 30, ABE Math Prep V 76854785 and ABE Math Prep VI 76854786 with a grade of "S." (Note: ABE Math Prep V and VI courses cannot be used to satisfy program completion requirements at Mid-State.)*

## SAMPLE FULL-TIME CURRICULUM OPTION

<b>Term</b>		<b>14 credits</b>
10623116	Technical Drawing Interpretation	2
31804305	Applied Mathematics	2
32420326	Introduction to Turning Machines	2
32420327	Turning Machine Foundations	3
32420328	Precision Turning Machine Applications	3
32420362	CNC Lathes/Manual Programming	2

<b>Term</b>		<b>14 credits</b>
32420310	Introduction to Solid Modeling	2
32420312	Metals Science	2
32420337	Introduction to Milling Machines	2
32420338	Milling Machine Foundations	3
32420339	Precision Milling Machine Applications	3
32420364	CNC Mills/Manual Programming	2

<b>Term</b>		<b>13 credits</b>
10623112	Manufacturing Practices	2
10801199	Employment Strategies	3
32420325	Inspection with Geometric Dimensioning	2
32420335	Lathes-Advanced	2
32420373	CNC Lathes Set Up and Operation	2
32444377	CNC Lathes Computer Aided Programming	2

<b>Term</b>		<b>13 credits</b>
32420336	Mills-Advanced	2
32420374	CNC Mills Set Up and Operation	2
32420380	Multi-Axis Machining Processes	3
32444378	CNC Mills Computer Aided Programming	3
32444379	Advanced CNC Milling Operations	3

**Total credits 54**

### Please Note:

- This curriculum sequence is only for student planning. Actual student schedules will vary depending on course availability.
- Program completion time may vary based on student scheduling and course availability. For details, go to [mstc.edu/classfinder](http://mstc.edu/classfinder).

## SAMPLE PART-TIME CURRICULUM OPTION

<b>Term</b>		<b>6 credits</b>
10623116	Technical Drawing Interpretation	2
31804305	Applied Mathematics	2
32420326	Introduction to Turning Machines	2

<b>Term</b>		<b>6 credits</b>
32420310	Introduction to Solid Modeling	2
32420312	Metals Science	2
32420337	Introduction to Milling Machines	2

<b>Term</b>		<b>8 credits</b>
32420327	Turning Machine Foundations	3
32420328	Precision Turning Machine Applications	3
32420362	CNC Lathes/Manual Programming	2

<b>Term</b>		<b>8 credits</b>
32420338	Milling Machine Foundations	3
32420339	Precision Milling Machine Applications	3
32420364	CNC Mills/Manual Programming	2

<b>Term</b>		<b>7 credits</b>
10801199	Employment Strategies	3
32420325	Inspection with Geometric Dimensioning	2
32420335	Lathes-Advanced	2

<b>Term</b>		<b>7 credits</b>
32420336	Mills-Advanced	2
32420374	CNC Mills Set Up and Operation	2
32444378	CNC Mills Computer Aided Programming	3

<b>Term</b>		<b>6 credits</b>
10623112	Manufacturing Practices	2
32420373	CNC Lathes Set Up and Operation	2
32444377	CNC Lathes Computer Aided Programming	2

<b>Term</b>		<b>7 credits</b>
32420380	Multi-Axis Machining Processes	3
32444379	Advanced CNC Milling Operations	3

**Total credits 54**

# course descriptions

## Advanced CNC Milling Operations

**32444379** .....3

This course will utilize classroom presentations, discussions and hands-on lab activities to build on the skills from previous classroom experiences to equip learners to follow the entire process of manufacturing from print to part and through final inspection using CNC milling machines. Learners will explore in-process automated part inspection with the use of machine based probing systems. Additionally, students will become accustomed to the use of Wire EDM machines and Coordinate Measuring Machines as they progress through the course.

*Prerequisite: CNC Mills/Manual Programming 32420364*

## Applied Mathematics

**31804305** .....2

Students taking Applied Math I make and convert various measurements. Students use formulas to solve problems. They compute dimensions of geometric shapes. Students use statistical tools to represent and analyze data. They analyze various financial situations. Students use basic right triangle trigonometry to solve problems. In each topic area, students solve application problems.

## CNC Lathes Computer Aided Programming

**32444377** .....2

This course introduces learners to Computer-Aided Machining/Manufacturing (CAM). Demonstrations and hands-on use of CAD/CAM software and hardware will be used. Major emphasis is placed on geometry creation and editing functions, process planning, proper cutter selection, feed and speed selection, and tool path generation along with post processing to CNC lathes. Some basic machine set-up and operation are included to verify program operation.

*Prerequisite: Introduction to Solid Modeling 32420310*

## CNC Lathes Set Up and Operation

**32420373** .....2

In this introductory Computer Numerical Control (CNC) machining course, students will practice the skills needed to setup and operate CNC lathes. Classroom presentations and lab projects will focus on safety, theory, terminology as it relates to completing machine setups in the CNC lathe. Topics covered will be tool and work offset setting, work holding and quality. Learners will work with proven CNC part programs and setup documents to create parts to specifications and ensure all parts of a production run maintain quality throughout the run.

*Prerequisite: CNC Lathes/Manual Programming 32420362*

## CNC Lathes/Manual Programming

**32420362** .....2

Covers NC/CNC terminology and introduces students to computers and components of NC/CNC lathes. All programming is manual word address (G+M Code) basics. Includes basic CNC lathe operation.

## CNC Mills Computer Aided Programming

**32444378** .....3

This course introduces learners to Computer-Aided Machining/Manufacturing (CAM). Demonstrations and hands-on of CAD/CAM software and hardware will be used. Major emphasis is placed on geometry creation and editing functions, process planning, proper cutter selection, feed and speed selection, and tool path generation along with post processing to CNC milling machines and machining centers. Some basic machine set-up and operation are included to verify program operation.

*Prerequisite: Introduction to Solid Modeling 32420310*

## CNC Mills Set Up and Operation

**32420374** .....2

In this introductory Computer Numerical Control (CNC) machining course, students will practice the skills needed to setup and operate CNC milling machines. Classroom presentations and lab projects will focus on safety, theory, terminology as it relates to completing machine setups in the CNC milling machine. Topics covered will be tool and work offset setting, work holding and quality. Learners will work with proven CNC part programs and setup documents to create parts to specifications and ensure all parts of a production run maintain quality throughout the run.

*Prerequisite: CNC Mills/Manual Programming 32420364*

## CNC Mills/Manual Programming

**32420364** .....2

Covers NC/CNC terminology and introduces students to computers and components of NC/CNC mills. All programming is manual word address (G+M code) basics. Includes basic CNC mill operation.

## Employment Strategies

**10801199** .....3

A course designed to assist students in securing employment. This communication-based course helps develop an awareness of personal and academic skills as they relate to the job seeking process. Topics of study include personal and skill assessments, research of employment sources, completion of application forms, formation of professional resumes, composition of various business letters, interviewing skills, and job offer evaluation. NOTE: To enroll you must have completed 50 percent of technical program credits or receive department approval. See program advisor, program faculty, program counselor, or department dean/associate dean to register.

## Inspection with Geometric Dimensioning

**32420325** .....2

This course will familiarize learners with interpreting Geometric Dimensioning and introduce dimensional metrology. Activities and classroom presentations will provide insight into the use of direct and indirect measuring tools, instrument calibration, and the use of Coordinate Measuring Machines, and quality documentation. Emphasis of the course will be on interpretation of Geometric Dimensioning and using metrology fundamentals to ensure manufactured components meet design specifications.

## Introduction to Milling Machines

**32420337**.....2

Explore the fundamentals of basic operations and safety of manual mills. Through the utilization of classroom and lab activities learners will acquire a basic understanding of the Milling Machine components as well as the cutting tools and basic work holding devices that may be used on the machine. The importance of proper tool selection and usage as utilizing the Milling Machines components properly will be the concentration.

## Introduction to Solid Modeling

**32420310**.....2

Introduces students creating computer-aided drafting (CAD) represented solid models for use in the manufacturing arena. As an introductory course in three-dimensional modeling, learners use computer software to develop two-dimensional sketches and use modeling tools to create solid models on the computer. Students also use the models to create and detail two-dimensional engineering drawings for use on the manufacturing floor. Computer knowledge and prior knowledge of drawing/drafting techniques is recommended.

## Introduction to Turning Machines

**32420326**.....2

This course will introduce functions and capabilities of turning machines known as lathes. Activities and hands-on lab exercises will be used to introduce learners to the most common applications of lathes in the machine shop. Shop safety, terminology, and identification of turning machines and related equipment in a machine shop environment will be introduced. Learners will also gain an understanding of basic setup and metal cutting processes performed on turning machines.

## Lathes-Advanced

**32420335**.....2

Students receive further insight into lathe concepts. Includes safety review and covers advanced cutting tool materials such as carbides, ceramics, cubic boron nitride (CBN), and polycrystalline diamonds (PCD). Tooling, speeds and feeds, cutting tool selection, and advanced machine practices such as multi-operations and process planning are also covered.  
*Prerequisite: Precision Turning Machine Applications 32420328*

## Manufacturing Practices

**10623112**.....2

As competition for market share continues to increase, manufacturers rely on innovations in technology, methods, and practices to give them the edge they need. To remain competitive globally, the watchwords are productivity, efficiency, and quality. In this course, students examine some of the practices that many manufacturing operations have come to rely on to make their operations competitive, efficient, and cost-effective. Topics covered in this class include the principles of lean manufacturing, value versus non-value added waste, 5S methodology, value stream mapping, setup reduction and quick changeover, cellular flow, building a lean culture, total productive maintenance, and statistical process control (SPC).

## Metals Science

**32420312**.....2

Introduces the field of metallurgy. Covers sources of common metals, including both ferrous and non-ferrous methods of ore extraction, and refining and classification of these metals and the alloy systems. The heat treatment of various metals and properties of metals are studied, including lab work on shear, compression, tensile strength, and corrosion.

## Milling Machine Foundations

**32420338**.....3

This course will develop additional skills needed for effective milling machine operations. Common work holding and fixturing tools will be utilized to create parts accurately. Classroom presentation and lab activities will be utilized to hone the learner's skills with manual milling machines. Attention will be on the use of advanced cutting tools and work holding techniques.

*Corequisite: Introduction to Milling Machines 32420337*

## Mills-Advanced

**32420336**.....2

Provides greater insight into milling machine concepts. Places major emphasis on milling machine terminology, work-holding methods, location principles, tooling, and cutting tool selection, in addition to operations and process planning. Includes rotary tables and indexing methods such as direct, simple, and angular.

*Prerequisite: Precision Milling Machine Applications 32420339*

## Multi-Axis Machining Processes

**32420380**.....3

Multi-Axis CNC machines have become standard in the machining industry. Participants in this course will become familiar with the set-up procedures for 4 and 5 axis milling machines, manual programming techniques, and advanced CAM programming for multi-axis positioning and contouring. Lab activities and classroom presentations will prepare students for the added machining versatility of multi-axis machines.

## Precision Milling Machine Applications

**32420339**.....3

Learners will build additional skills from previous classroom experiences related to milling machines. Classroom presentations and lab projects will focus on safety, theory, terminology, machine tool setups, calculations and machine operations. Projects will be built using milling machines. Special attention will be on safety, print reading, layout, inspection and shop math.

*Corequisite: Introduction to Milling Machines 32420337*

**Precision Turning Machine Applications**  
**32420328.....3**  
This course will continue to build skills on applications of turning machine operations. Presentations and lab activities will prepare learners to work efficiently and accurately with precision tolerances as a standard. Learners will be introduced to multiple lathe operations including drilling, reaming, thread cutting processes, and an introduction to CNC lathe operations.  
*Corequisite: Introduction to Turning Machines 32420326*

**Technical Drawing Interpretation**  
**10623116.....2**  
Technical drawings are the heart of the manufacturing process. This course will develop proficiency with the visualization of multi-view orthographic projection drawings, interpretation of print symbols, dimensioning standards, tolerance standards, assembly drawings, section and auxiliary views. Included in this course will be hands on drawing and interpretation of prints as well as classroom presentations.

**Turning Machine Foundations**  
**32420327.....3**  
Students enrolled in this course will build additional skills from previous classroom experiences related to turning machines. Presentations and lab activities will focus on safety, machine setups, common calculations encountered, and chip making processes. Learners lab projects will be created using techniques to insure accuracy, efficiency and repeatability. Emphasis will be put on common procedures and inspection processes to produce quality components.  
*Corequisite: Introduction to Turning Machines 32420326*