

PRECISION MACHINING TECHNICIAN

Technical Diploma Program Code: 31-420-10 Total Credits: 51-52

The Precision Machining 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

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.

CHECKLIST:

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

- ☐ FAFSA (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 • TTY: 711



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

CAREER PATHWAY • BEGIN AT ANY POINT



CREDIT FOR PRIOR LEARNING AND EXPERIENCE

CREDIT FOR PRIOR LEARNING AND EXPERIENCE

- Certifications and Licenses
- High School Credit
- Military Experience
- National/Standardized Exams
- Transfer Credit
- Work and Life Experience

Learn about Credit for Prior Learning at mstc.edu/cpl.

TECHNICAL DIPLOMA

PRECISION MACHINING TECHNICIAN

Technical Diploma • 51-52 Credits

Start Your Career

- Advanced Machine Operator
- CNC Machine Operator
- Job Shop Machinist
- Apprenticeship

BACHELOR'S DEGREE

BACHELOR'S DEGREE OPTIONS

For more information and additional opportunities, visit mstc.edu/transfer.

OTHER OPTIONS

RELATED PROGRAMS

- Industrial Mechanical Technician
- Metal Fabrication
- Manufacturing Operations Management
- Stainless Steel Welding
- Welding

APPRENTICESHIP OPPORTUNITIES

- Machinist Apprenticeship

Employers will expect you, as a Precision Machining Technician graduate, to be able to:

- ## TECHNICAL SKILLS ATTAINMENT

NOTES:

Visit 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.

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.

10890102 1 credit


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

108311043 credits


108341093 credits

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


Term		13-14 credits
31804305	Applied Mathematics	2
-or-		
10804107	College Mathematics 	3
32420311	Safety, Measurement, and Layout	1
32420326	Introduction to Turning Machines	2
32420329	Intermediate Turning Applications	5
32420373	CNC Lathes Set Up and Operation	2
32623302	Print Reading for Machine Tool	1

Term		12 credits
31801368	Workplace Communication	1
32420310	Introduction to Solid Modeling	2
32420337	Introduction to Milling Machines	2
32420340	Intermediate Milling Applications	5
32420374	CNC Mills Set Up and Operation	2

Term		12 credits
32420312	Metals Science	2
32420325	Inspection with Geometric Dimensioning	2
32420330	Advanced Turning Applications	3
32420362	CNC Lathes/Manual Programming 	2
32444377	CNC Lathes Computer Aided Programming	2
32623301	Manufacturing Principles	1

Term		14 credits
32420341	Advanced Milling Applications	3
32420364	CNC Mills/Manual Programming	2
32420380	Multi-Axis Machining Processes	3
32444378	CNC Mills Computer Aided Programming	3
32444379	Advanced CNC Milling Operations	3

Total credits 51-52


 This course has options available to receive credit for prior learning (CPL) or work experience. Visit the website at mstc.edu/cpl or contact your advisor for details.

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/schedule.

SAMPLE PART-TIME CURRICULUM OPTION

Term		6 credits
32420311	Safety, Measurement, and Layout	1
32420312	Metals Science	2
32420326	Introduction to Turning Machines	2
32623302	Print Reading for Machine Tool	1


Term		6-7 credits
31804305	Applied Mathematics	2
-or-		
10804107	College Mathematics 	3
32420310	Introduction to Solid Modeling	2
32420337	Introduction to Milling Machines	2

Term		6 credits
32420329	Intermediate Turning Applications	5
32623301	Manufacturing Principles	1

Term		6 credits
32420340	Intermediate Milling Applications	5
32623301	Manufacturing Principles	1

Term		6 credits
31801368	Workplace Communication	1
32420325	Inspection with Geometric Dimensioning	2
32420330	Advanced Turning Applications	3

Term		8 credits
32420341	Advanced Milling Applications	3
32420364	CNC Mills/Manual Programming	2
32444378	CNC Mills Computer Aided Programming	3

Term		6 credits
32420373	CNC Lathes Set Up and Operation	2
32420362	CNC Lathes/Manual Programming 	2
32444377	CNC Lathes Computer Aided Programming	2

Term		6 credits
32420380	Multi-Axis Machining Processes	3
32444379	Advanced CNC Milling Operations	3

Total credits 51-52

COURSE DESCRIPTIONS

Advanced CNC Milling Operations

324443793 credits

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.

Corequisite: CNC Mills/Manual Programming 32420364

Advanced Milling Applications

324203413 credits

Students in this class will receive further insight into milling machine concepts. This course places major emphasis on work-holding methods with the use of jigs and fixtures. Jig and fixture design elements for location and rigid work holding in both a production environment as well as single piece runs, and advanced cutting tools and cutting processes will be explored to focus on manufacturing efficiency.

Prerequisite: Intermediate Milling Applications 32420340

Advanced Turning Applications

324203303 credits

Students in this class will receive further insight into turning machine concepts. This course includes a safety review and adds depth in advanced cutting tool materials such as ceramics, cubic boron nitride (CBN), and polycrystalline diamonds (PCD). Learners will explore differing fixturing and tooling needs for a production environment as well as planning for single piece runs.

Prerequisite: Intermediate Turning Applications 32420329

Applied Mathematics

318043052 credits

Students taking Applied Mathematics 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

324443772 credits

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

324203732 credits

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.

CNC Lathes/Manual Programming

324203622 credits

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

324443783 credits

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

324203742 credits

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.

CNC Mills/Manual Programming

324203642 credits

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.

COURSE DESCRIPTIONS

College Mathematics ☑

108041073 credits

Designed to review and develop fundamental concepts of mathematics pertinent to the areas of: 1) arithmetic and algebra; 2) geometry and trigonometry; and 3) probability and statistics. Special emphasis is placed on problem solving, critical thinking and logical reasoning, making connections, and using calculators. Topics include performing arithmetic operations and simplifying algebraic expressions, solving linear equations and inequalities in one variable, solving proportions and incorporating percent applications, manipulating formulas, solving and graphing systems of linear equations and inequalities in two variables, finding areas and volumes of geometric figures, applying similar and congruent triangles, converting measurements within and between US and metric systems, applying Pythagorean Theorem, solving right and oblique triangles, calculating probabilities, organizing data and interpreting charts, calculating central and spread measures, and summarizing and analyzing data.

Prerequisite: High School GPA of 3.0 or Accuplacer Arithmetic of 250 and QAS 234 or ACT of 17 or Pre-Algebra 10834109 with a grade of "C" or better or equivalent. Students are encouraged to bring transcripts for further evaluation if they do not meet these requirements.

Inspection with Geometric Dimensioning

32420325.....2 credits

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.

Intermediate Milling Applications

324203405 credits

This course will develop additional skills needed for effective milling machine operations. Common work holding and fix turing tools will be utilized to create parts accurately and efficiently. Classroom presentation and lab activities will be utilized to hone the learner's skills with manual milling machines. Attention will be on safety, machine setups, operations, calculations, and inspection.

Corequisite: Introduction to Milling Machines 32420337

Intermediate Turning Applications

324203295 credits

Students enrolled in this course will build additional skills from previous classroom experiences related to turning machines. Presentations and lab activities will focus on machine setups, metal removal techniques, and common calculations encountered on the job. Lab projects will be created using techniques to ensure accuracy, efficiency, and repeatability with an introduction to CNC. Emphasis will be put on common turning procedures with inspection processes to produce quality components.

Corequisite: Introduction to Turning Machines 32420326

Introduction to Milling Machines

324203372 credits

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

324203102 credits

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

324203262 credits

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.

Manufacturing Principles

326233011 credit

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).

COURSE DESCRIPTIONS

Metals Science

324203122 credits

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.

Multi-Axis Machining Processes

324203803 credits

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.

Prerequisites: CNC Lathes Set Up and Operation 32420373 and CNC Mills Set Up and Operation 32420374

Print Reading for Machine Tool

32623302.....1 credit

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.

Safety, Measurement and Layout

32420311.....1 credits

In this course students become familiar with the machine shop environment. An overview of safety is covered with emphasis in lathes, mills, cut-off machines, and grinders. Learners are also introduced to measurement with various types of precision measurement tools, including micrometers, height gages, and calipers.

Workplace Communication

318013681 credit

Analyze workplace communication situations to develop professional verbal and written communication skills. Learners apply verbal and written communication skills, as well as conflict resolution strategies, to improve workplace communication climates and promote personal and professional growth.