

Machine Tool Operations Certificate

Program Number: 90-420-2

Certificate

Manufacturing Program Cluster

School of Applied Technology

Program offered at Madison Campuses

For information call: (608) 246-6102 or
(800) 322-6282 Ext. 6102

About the Certificate

The Machine Tool Operations certificate prepares students for employment in the machining and metalworking industries.

Students learn to operate machine tools such as milling machines, manual lathes, and drill presses. Studies will also include an introduction on using CAD-CAM to operate and program CNC machines.

After students have completed this program, an additional year of training is available through the Machine Tooling Technics program.

This is for students interested in:

- 1.) Advancing their CAD-CAM / CNC skills; and 2.) Developing skills to design, build and inspect a machine part.

Certificate Application Process

To apply, see: [Apply Online](#) (on the Madison College website). [Create an ApplyWeb account](#) and follow the [instructions](#) to complete the [Online Certificate Application](#) before the [application deadline](#). Submit the \$15 non-refundable fee (payable by credit card, debit card or electronic check) with your application. Applicants may submit more than one certificate application per term using the Online Certificate Application; the same fees apply for each additional application.

Unique Requirements for Completion

The certificate will be awarded upon completion of the requirements with a minimum of a 2.0 grade average. The certificate will be awarded when completion of all requirements is verified after the semester the last course has been completed.

Curriculum

Courses	Credits	Hrs/week Lec-Lab
32-420-345 Drawing Interpretation 1 ^o	2	4-0
32-420-346 Intro to CNC – G-code Programming ^o	2	3-1
32-420-351 Elements of Basic Metrology ^o	2	2-2
32-420-322 Machine Tool 1* ^o	4	4-12
32-420-323 Machine Tool 2* ^o	4	4-12
31-801-356 Communications 1 ^o	1	2-0
31-804-381 Machine Tool Mathematics 1 ^o	2	4-0
32-420-304 Intermediate Metrology Applications [♦]	1	1-1
32-420-324 Machine Tool 3* [♦]	4	4-12
32-420-325 Machine Tool 4* [♦]	4	4-12
32-420-388 Tool and Fixture Design [♦]	1	2-0
32-420-390 Fundamentals of Metallurgy [♦]	2	4-0
32-420-348 Applied CNC- Conversational & Setup [♦]	2	1-3
32-420-337 Manufacturing w/Solid Modeling- 2D [♦]	2	4-0
31-804-382 Machine Tool Mathematics 2 [♦]	1	2-0
Total	34	

*Meets for 9 weeks.

^o Fall course offering

[♦] Spring course offering

Note:

Courses are listed in suggested sequence. Enrollment for courses adhere to course pre-requisites and co-requisites as indicated at the end of each course description.

Note: Students are placed in English or mathematics courses based on their scores on the COMPASS or ASSET test or on completion of the appropriate prerequisite/s.



Program Courses

32-420-304 Intermediate Metrology Applications 1 credit

Course studies precision inspection methods while utilizing optical and electronic precision measuring instruments such as the profilometer, optical comparator, microscope, laser alignment machines, the Coordinate Measuring Machine and state-of-the-art computerized vision system. Pre-reqs: 32-420-35.

32-420-322 Machine Tool 1 4 credits

Introduces the basic concepts and skills using engine lathes, milling machines, power saws, Drill presses and bench applications. Emphasizes safety and proper operation of tools and machines, speeds, feeds, cutting tools, tool geometry, tool grinding and work-holding devices. Stresses dimensional accuracy, finish and quality as well as team-building and work ethics. Co-reqs: Machine Tool 2 (32-420-323), Elementary Metrology (32-420-351), and Drawing Interpretation (32-420-345).

32-420-323 Machine Tool 2 4 credits

Expands on basic concepts and skills using engine lathes, milling machines, power saws, drill presses, bench applications, CNC setup and operation. Emphasizes safety and proper operation of tools and machines, speeds feeds, cutting tools, tool geometry, tool grinding and work-holding devices. Stresses dimensional accuracy, finish and quality with team-building and work ethics. Co-reqs: Machine Tool 1 (32-420-322), Elementary Metrology (32-420-351), and Drawing Interpretation (32-420-345).

32-420-324 Machine Tool 3 4 credits

Expands the concepts and skills using engine lathes, milling machines, power saws, drill presses, bench applications, and advanced CNC setup and operation. Emphasizes safety and proper operation of tools and machines, speeds feeds, cutting tools, tool geometry, tool grinding and work-holding devices. Stresses dimensional accuracy, finish and quality with team-building and work ethics. Pre-reqs: Machine Tool 2 (32-420-323); Elem. Basic Metrol. (32-420-351); and Drawing Interp. (32-420-345). Co-reqs: Machine Tool 4 (32-420-325); Fund. of Metall. (32-420-390); and Intermediate Metrology (32-420-304).

32-420-325 Machine Tool 4 4 credits

Expands on basic concepts and skills using engine lathes, milling machines, power saws, drill presses, bench applications, CNC setup and operation. Emphasizes safety and proper operation of tools and machines, speeds feeds, cutting tools, tool geometry, tool grinding and work-holding devices. Stresses dimensional accuracy, finish and quality with team-building and work ethics. Co-req: Machine Tool 3 (32-420-324).

32-420-337 Manufacturing w/Solid Modeling--2D 2 credits

This course offers instruction on individual computer workstations in a computer lab. This computer-aided drafting (CAD) instruction uses Solid Modeling software that is capable of creating 3D models and manufacturing drawings. In this course you will spend half of the time creating 3D models using 2 and 2.5D features while exploring the concepts of working in 3D space. Once the solid models are created students will import the solid models into CAM (Computer-aided manufacturing) software and utilize machining concepts to produce manufactured part using 2.5D programming methods such as pocketing, contouring & drilling for milling machines as well as turning, facing, grooving and threading for turning centers. Pre-reqs- Intro to CNC—G-code Programming (346), Co-Applied CNC—Conversational & Setup

32-420-345 Drawing Interpretation 1 2 credits

Basic principles of engineering drawings and manufacturing procedures. Through interpretation and sketching, students learn to visualize the part, section or assembly. Uses drawings pertinent to the trade with examples.

32-420-346 Intro to CNC –G-code Programming 2 credits

Hands-on and lecture course exposing students to CNC (Computer Numerical Control). Emphasizes CNC vertical milling machines and CNC turning centers. Covers history, basic CNC understanding and beginning programming including G-codes, M-codes. Students will utilize simulation software that will verify manually written code. Co-req: 32-420-322

32-420-348 Applied CNC – Conversational & Setup 2 credits

This introductory Applications class familiarizes students with the basic setup procedures of CNC milling machines and CNC turning centers. They will set up rough stock and execute existing programs to produce finished parts. Once students learn these concepts they utilize the conversational programming software on the various CNC machines to program and produce parts. Pre-reqs- Intro to CNC—G-code Programming (346), Co-Manufacturing w/Solid Modeling—2D

32-420-351 Elements of Basic Metrology 2 credits

This course introduces the principles of basic dimensional measurement, layout techniques for machines, use of direct and indirect measuring tools as well as the use of length standards relative to calibration of measuring instruments and the basic operation of the Coordinate Measuring Machine.

32-420-388 Tool and Fixture Design 1 credit

Introduces tool design and gauging. Emphasizes jigs, fixture design, clamping, locating devices and tooling and production methods. Presents preset and qualified tooling for NC/CNC as they relate to conventional practice Pre-req: Drawing Interpretation (32-240-345).

32-420-390 Fundamentals of Metallurgy 2 credits

Introduces metallurgy, emphasizing applications, selection, identification methods and alloy influences. Studies metal properties using testing, micro-structure interpretation and heat-treatment processes. Covers tool steels, weld heat effects, failure analysis and machinability variations in cast iron, alloy steels and non-ferrous materials in detail.

Career Potential:

A graduate of this program will have the potential for employment in the following areas:

- CNC Machine Operator
- Maintenance / Repair Machinist
- Machinist Apprentice

With additional education and / or work experience graduates may find other opportunities for employment.

- Advanced Careers in CAD/CAM and CNC
- CNC Programmer
- Precision Machinist
- Machine Builder
- Tool and Die maker
- Quality Control Inspector
- Machine Shop Supervisor
- Career laddering options too numerous to mention

More detailed and updated information on this program may be available at: madisoncollege.org. The college reserves the right to make changes in the regulations and courses announced in this publication without notice.

Madison Area Technical College provides equal opportunity in education and employment.