

Machining Technology offers training in using computer-controllers on CNC machine tools, manual machining tools, and computers as tools in machine tool control inspection (CMM), mechanical design, and engineering.

The Basic Manufacturing Technician Certificate (pending State Board of Education approval) serves as a pathway to higher level manufacturing-related training in a wide range of certificate and degree programs, and also prepares students for entry-level employment in a variety of manufacturing-related settings.

The first year of study emphasizes basic machining skills as they relate to computer-numerical control (CNC) as well as manual machining, basic measuring and inspection, and print reading. Students completing the first year may find employment as entry-level machine tool operators.

Second-year classes build on previously-learned knowledge and skills and concentrate on further enhancement of CNC and manual skills in programming and machine tool set-ups. Students will use extended time in machining labs to solve increasingly complex “real world” programming and fixturing issues. After successful completion, graduates may find employment in the fields of machining/programming and engineering technology.

If you are interested in manufacturing, machining, manual operations, or CNC, contact Sheldon Schnider (sschnide@chemeketa.edu, 503.589.7875).

Program outcomes

Students completing the Basic Manufacturing Technician Certificate will:

- Analyze and discuss current manufacturing processes.
- Interpret and evaluate blueprints and specifications to determine accuracy.
- Apply workplace rules and safety and environmental standards used in the workplace.
- Identify and use measurement instruments to produce a product.
- Construct a product using industry acceptable manufacturing principles.

Students completing the CAM Fundamentals Certificate will:

- Use effective communication skills as a team member.
- Apply basic and precision industry standard measurement practices.
- Set up and operate Computer Numerical Controlled (CNC) machine tools to produce accurately sized parts.
- Apply cutting speeds and feeds to materials used in machining and manufacturing.

Students completing the CNC Operator Certificate will:

- Use effective communication skills as a team member.
- Apply basic and precision industry standard measurement practices.
- Set up and operate Computer Numerical Controlled (CNC) machine tools and program CNC machine tools at the machine control level to produce accurately sized parts.
- Apply cutting speeds and feeds to materials used in machining and manufacturing.

Students completing the Manual Machine Operator Certificate will:

- Use effective communication skills as a team member.
- Apply basic and precision industry standard measurement practices.
- Set up and operate manual machine tools to produce accurately sized parts.
- Apply cutting speeds and feeds to materials used in machining and manufacturing.

Students completing Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) AAS will:

- Produce accurate 2-D and 3-D drawings using CAD software.
- Use effective communication skills as a team member.
- Program CNC machine tools at the machine control level.
- Perform advanced set-ups and operations using manual and/or Computer Numerical Controlled (CNC) equipment to produce accurately sized parts.
- Create parametric solid models and generate CNC code through CAM software to manufacture parts on CNC machine tools.
- Design and build fixtures and tooling for manufacture production purposes to meet customer specifications.
- Determine optimal production process planning to meet customer requirements. Select and optimize available machines and equipment to meet product process requirements.
- Calculate power requirements, select drive and system components, and design criteria for mechanical systems.

Getting started

The first step to entering the following programs is to take part in an assessment process, which includes taking the college’s free placement test and meeting with Counseling and Career Services staff. You may need to complete pre-program courses. Then, your advisor will help you develop an individualized program of study, which may include one or more of the following:

MTH020	Basic Mathematics	4
RD090	College Textbook Reading.....	3
WR049	Basic Writing.....	4

Chemeketa Community College

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If you have questions about the curriculum or the Getting Started classes, please contact program chair Sheldon Schneider at 503.589.7975 (sheldon@chemeketa.edu); the office of the Associate Dean of Trades and Technologies, 503.399.5210; or Counseling and Career Services at 503.399.5120 or 503.399.5210. Failure to be assessed may delay your entry into program classes.

Basic Manufacturing Technician Certificate of Completion

The Basic Manufacturing Technician training (pending State Board of Education approval) covers the basics of machine tool fundamentals, measurement, and basic blueprint reading. Specialty areas for electives include welding, manual machining, and CNC mill operations. As a statewide cooperative effort this program is also offered by other community colleges, including Clackamas, Linn-Benton, Lane, and Portland.

In addition to tuition, estimated costs for students who complete the certificate listed below are books, \$215; class fees, \$54; universal fee, \$140; equipment and supplies, \$125. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn a Certificate of Completion by successfully completing the Basic Manufacturing Technician required core of 10 credit hours, plus the additional credits in one area of specialization listed below.

Basic Manufacturing Technician core requirements (10 credit hours):

Course	Title	Credit Hours
CAM050	Orientation to Manufacturing Processes	2
CAM100	Blueprint Reading and Sketching	2
CAM105	Precision Measurement	2
CAM111	Industrial Safety Seminar	1
MTH052	Introduction to Algebra and Geometry	3

Plus: Choose one area of specialization

Welding Specialization

WLD051	Basic Arc Welding	5
WLD056	Blueprint Reading and Sketching	2

CNC Mill Specialization

CAM110A	CNC/Manual Fundamentals	4
CAM120	CNC/Manual Milling	4

Machining Specialization

CAM110A	CNC/Manual Fundamentals	4
CAM140	Metallurgy for Manufacturing	2

Computer-Aided Manufacturing (CAM) Fundamentals Certificate of Completion

The CAM Fundamentals Certificate offers training in the knowledge and skills used by employees in manufacturing and related occupations. The certificate includes courses in manufacturing materials, interpretation of engineering drawings, measuring practices, bench and layout work, and basic setup and operation of computer controlled mills and lathes. This certificate may qualify graduates for an entry position in a variety of manufacturing-related jobs.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$569; class fees, \$162; universal fee, \$240; equipment and supplies, \$150. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn a Certificate of Completion by successfully completing the required 30 credits with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
CAM100	Blueprint Reading and Sketching	2
CAM105	Precision Measurement	2
CAM110A	CNC/Manual Fundamentals	4
CAM111	Industrial Safety Seminar	1
CAM130	CNC Machine Setup/Operation	4
MTH052	Introduction to Algebra and Geometry+	3
	or	
MTH081	Technical Mathematics 1	4
	or	
MTH111	College Algebra (or higher)	5
Term 2		
CAM115	Geometric Dimensioning/Tolerancing	2
CAM116	Geometric Dimensioning/Tolerancing for CNC— Lab	1
CAM140	Metallurgy for Manufacturing	2
COM051	Communication Skills 1+	3
MTH053	Introduction to Trigonometry and Geometry	3
PSY104	Psychology in the Workplace+	3

Computer Numerically Controlled (CNC) Operator Certificate of Completion

This CNC Operator Certificate builds on the training provided in the CAM Fundamentals certificate with an emphasis on the setup and operation of computer-controlled machines. The certificate includes courses in manual programming ("G code") for both mills and lathes. Graduates of this certificate may qualify to work as a CNC machine tool operator or in a variety of manufacturing-related jobs.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$719; class fees, \$234; universal fee, \$360; equipment and supplies, \$200. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn a Certificate of Completion by successfully completing the required 45 credits with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
CAM100	Blueprint Reading and Sketching	2
CAM105	Precision Measurement	2
CAM110A	CNC/Manual Fundamentals	4
CAM111	Industrial Safety Seminar	1
CAM130	CNC Machine Setup/Operation	4
MTH052	Introduction to Algebra and Geometry+	3
	or	
MTH081	Technical Math 1	4
	or	
MTH111	College Algebra (or higher)	5

Term 2

CAM115	Geometric Dimensioning/Tolerancing	2
CAM116	Geometric Dimensioning/Tolerancing for CNC—Lab	1
CAM140	Metallurgy for Manufacturing	2
CAM160	Programming CNC Mills	4
MTH053	Introduction to Trigonometry and Geometry	3
PSY104	Psychology in the Workplace+	3

Term 3

CAM150	Cutting Tools and Materials	3
CAM190	Programming CNC Lathes	4
CAM280D	Cooperative Work Experience	4
COM051	Communication Skills 1+	3

Manual Machine Operator Certificate of Completion

The Manual Machine Operator certificate builds on the training provided in the CAM Fundamentals certificate with an emphasis on machining skills related to the setup and operation of manual machine tools such as drills, mills, lathes, saws, and grinders. Graduates may qualify to work as a machine tool operator, entry-level machinist, or in a variety of manufacturing-related jobs.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$654; class fees, \$234; universal fee, \$360; equipment and supplies, \$200. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn a Certificate of Completion by successfully completing the required 45 credits with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
CAM100	Blueprint Reading and Sketching	2
CAM105	Precision Measurement	2
CAM110A	CNC/Manual Fundamentals	4
CAM111	Industrial Safety Seminar	1
CAM130	CNC Machine Setup/Operation	4
MTH052	Introduction to Algebra and Geometry+	3
	or	
MTH081	Technical Mathematics 1	4
	or	
MTH111	College Algebra (or higher)	5
Term 2		
CAM115	Geometric Dimensioning/Tolerancing	2
CAM116	Geometric Dimensioning/Tolerancing for CNC—Lab	1
CAM120	CNC/Manual Milling	4
CAM140	Metallurgy for Manufacturing	2
MTH053	Introduction to Trigonometry and Geometry	3
PSY104	Psychology in the Workplace+	3
Term 3		
CAM121A	CNC/Manual Lathe	4
CAM150	Cutting Tools and Materials	3
CAM280D	Cooperative Work Experience	4
COM051	Communication Skills 1+	3

Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) Associate of Applied Science

The Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) program offers training in using computers as tools in engineering, drafting, machine tool control inspection (the CMM), and industrial mechanical design.

The first year of study emphasizes machining skills as they relate to Computer Numerical Control machining. Students completing the first year may find employment as entry-level machine tool operators and CNC programmers.

Second-year classes concentrate on integrating mechanical design and computer-aided manufacturing programming and advanced manual skills. Students apply knowledge and skills to solve increasingly complex fixturing and machining problems. After successful completion, graduates may find employment in the fields of engineering technology and manufacturing operations. Graduates will use computers on the job for drafting, design and programming, and operating CNC machine tools.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$1,388; class fees, \$321; universal fee, \$736; tools and supplies, \$4,200. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 92 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
CAM100	Blueprint Reading and Sketching	2
CAM105	Precision Measurement	2
CAM110A	CNC/Manual Fundamentals	4
CAM111	Industrial Safety Seminar	1
CAM130	CNC Machine Setup/Operation	4
DRF130	CAD 1	3
MTH052	Introduction to Algebra and Geometry+	3
	or	
MTH081	Technical Mathematics 1+	4
	or	
MTH111	College Algebra+ (or higher)	5
Term 2		
CAM115	Geometric Dimensioning/Tolerancing	2
CAM116	Geometric Dimensioning/Tolerancing for CNC— Lab	1
CAM120	CNC/Manual Milling	4
CAM140	Metallurgy for Manufacturing	2
CAM160	Programming CNC Mills	4
MTH053	Introduction to Trigonometry with Geometry	3
	or	
MTH082	Technical Mathematics 2	4
	or	
MTH112	Trigonometry (or higher)	5

Term 3

CAM062	Practical Applications 2	2
	or	
CAM280B	Cooperative Work Experience.....	2
CAM121A	CNC/Manual Lathe	4
CAM150	Cutting Tools and Materials	3
CAM190	Programming CNC Lathes	4
COM051	Communications Skills 1+	3
	or	
WR121	English Composition—Exposition+ (or higher).....	3

Term 4

CAM210A	Production/Assembly Control Methods	2
CAM210B	Production/Assembly Control Methods—Lab	2
CAM230	CAM Applications/Mills.....	3
DRF210	Parametric Design.....	3
PH121	Applied Physics	4
	or	
PH201	General Physics (or higher).....	4

Term 5

CAM220A	Advanced Lathe Processes.....	2
CAM220B	Advanced Lathe Processes—Lab	2
CAM260	CAM Applications/Lathes	3
DRF260	Tool Design.....	3
PSY104	Psychology in the Workplace+	3

Term 6

CAM290A	CAD/CAM Integrations	8
COM053	Technical Report Writing	3
	or	
WR227	Technical Writing.....	3
DRF262	Machine Design	3