

# Advanced Manufacturing Technology Precision Machining

## GENERAL INFORMATION

Everett Community College offers a number of pathways toward technical careers, using stackable certificates and degrees. The first level, for students seeking entry into the technical world would be the **Manufacturing Pre-Employment Certificate**, a credential that would allow one to work in entry-level manufacturing. The next level up would be to take classes leading to a **Skills-Oriented Certificate**. And for those seeking a higher level of education, and the job skills and responsibilities that go with it, EvCC offers skills oriented **ATA Degrees**. This Advanced Manufacturing Technology curriculum guide describes all three levels in the Precision Machining discipline. This program also provides a flexible framework for the incorporation of credit from prior learning in industry or government. An early conference with one of the designated advisors is strongly suggested for success.

## THE PROGRAM

The Advanced Manufacturing Technology – Precision Machining Program is part of a cluster of programs. Four **Associate in Technical Arts degrees** and five **certificates in Advanced Manufacturing Technology** are offered, and may be pursued on a full-time or part-time basis at Everett Community College (EvCC).

### ATA degree Programs (all are 90 credits):

- **Advanced Manufacturing Tech – Precision Machining**
  - **Advanced Manufacturing Tech – Technical Design (CAD)\***
  - **Advanced Manufacturing Tech – Composites\***
  - **Advanced Manufacturing Tech - Welding and Fabrication\***
- \* Described in a separate guide.

### Certificate Programs :

- **Manufacturing Pre-Employment (12 credits)**
  - **Precision Machining (40 credits)**
  - **Technical Design (CAD) (43 credits)\***
  - **Composites (31 credits)\***
  - **Welding and Fabrication (43 credits)\***
- \* Described in a separate guide.

The overall program is designed for maximum flexibility, in that one may choose to take one or two courses to enhance their current skills, or pursue a certificate or degree, depending on their goals. The program outcomes for students pursuing the degree will prepare them to perform the following tasks:

- Solve technical mathematical problems
- Read and understand basic engineering drawings
- Understand and utilize machine technology
- Write programs and setup CNC machines
- Operate and perform maintenance on CNC machines
- Document technical activities in written and verbal reports
- Be prepared for successful employment

In general, the Associate of Technical Arts (ATA) degree has limited transferability to a university for a bachelor's degree. However, Central Washington University offers a Bachelor of Applied Science with a specialization in Administrative Management that accepts the ATA degree. Go to [www.uceverett.org](http://www.uceverett.org) for more information.

## CREDIT FOR PRIOR LEARNING

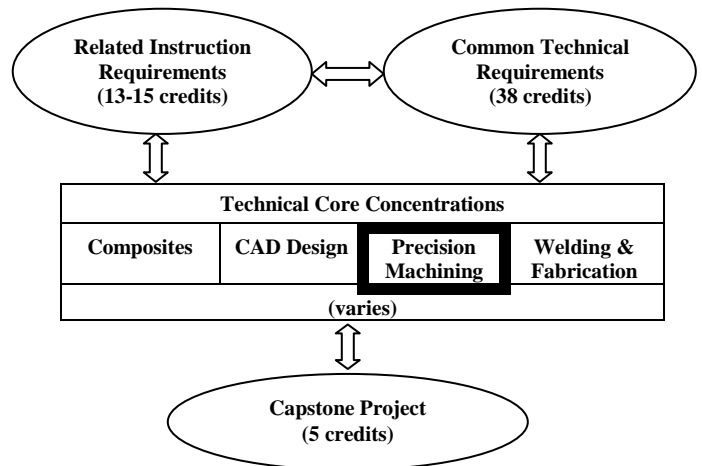
Adults with work experience or completion of industry training programs may be eligible for college credit by following "External Credit" evaluation procedures. Students currently in high school may take selected technical courses while in high school and apply at that time for college credit.

External Credit: Contact Enrollment Services  
Call: 425-388-9219

Tech Prep: [www.everettcc.edu/techprep](http://www.everettcc.edu/techprep)  
Or contact your high school counselor

## THE COURSES

The courses for this program may be divided into four categories: related instruction requirements (13-15 credits), common technical requirements (38 credits), technical core concentration classes (20 to 40 credits), and the final capstone class (5 credits). Students seeking an ATA degree will take the number of credits shown in each area plus a number of technical elective classes until the total credit accumulations meets or exceeds the degree requirement. Note that a minimum of 20-40 credits need to come from any one technical concentration to qualify for that particular degree. The actual courses are listed further on in this curriculum guide. See the diagram below for an understanding of how the courses interrelate.



## GETTING STARTED AT EVCC

Our Enrollment Services Office provides information about application, advising, orientation and registration for new and continuing students. Students interested in the program should talk to an advisor prior to selecting classes for the first quarter:

Educational Planning Center	425-388-9339
Enrollment Services	425-388-9219
BS at CWU (Paddy Chamberlain)	425-259-8904
Precision Machining (Terry Elmore)	425-388-9964 ext. 7374
Welding (Dan Minzel)	425-388-9447
Composites (Pat Murphy)	425-388-9534
CAD (Pheeson Liaw)	425-267-0160
CAD (Robert Osnes)	425-388-9383

# ATA Degree: Advanced Manufacturing Tech – Precision Machining

## 90 credits

The courses required for an **Associate in Technical Arts Degree in Advanced Manufacturing Tech – Precision Machining** are listed below. Students should meet with an advisor and maintain this checklist while at Everett Community College. The quarter before expected completion, this checklist should be submitted with a diploma application to the Enrollment Services Office. EvCC does not offer every course each quarter, so please consult a class schedule and an advisor to plan course selections. Note that to earn this degree, each of these courses must be completed with a grade of 2.0 or higher.

Courses listed with an ampersand in the course number (e.g. ENGL&101) reflect the new Common Course Numbering System.

**Student Name:** \_\_\_\_\_ **Advisor Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**COMPLETION of Diversity Course (BUS 110D or CMST 204D suggested):**

\_\_\_\_\_  
Where Completed/Course Title      (Year Completed)      (Grade)

<u>Course Number</u>	<u>Course Title</u>	<u>Credits</u>	<u>Quarter Planned</u>	<u>Quarter completed</u>	<u>Grade</u>
<b>RELATED INSTRUCTION (13-15 credits)</b>					
ENG T 101 (or MATH 091 AND 092 or 098, 099 or higher)*	Introduction to Graphics and Measurements	5	_____	_____	_____
ENGL 098 or ENGL& 101	Intro to College Writing or English Composition I	5	_____	_____	_____
BUS 110D, BUS 165, CMST& 210, CMST 230, CMST 204D, HDEV 155	Human Relations (R) course taken from this group:	3-5	_____	_____	_____
<b>COMMON TECHNICAL REQUIREMENTS (38 credits)</b>					
CL 101	Computer Literacy	5	_____	_____	_____
HLTH 141 (or WELD 154)*	Industrial Safety	3	_____	_____	_____
ENG T 100	Engineering Graphics 2D AutoCAD I	4	_____	_____	_____
ENG T 102 (or PHYS 102/ MATH& 141)	Technical Problem Analysis	5	_____	_____	_____
ENG T 105	Precision, Fits, Tolerancing and GD&T (CAD based)	4	_____	_____	_____
ENGR& 114 (or ENG T 108)	Engineering Graphics (Solid Works I)	4	_____	_____	_____
ENG T 213 (or PHYS 102/ MATH& 141)	Pneumatic, Hydraulic and Electrical Circuits	5	_____	_____	_____
ENG T 230, WELD 151 or WELD 152	Materials & Processes Class	3	_____	_____	_____
MFG T 202	Operations Management	5	_____	_____	_____
<b>PRECISION MACHINING TECHNICAL CORE REQUIREMENTS (40 credits)</b>					
MFG T 104	Machine Operator I	20	_____	_____	_____
MFG T 105	Machine Operator II	20	_____	_____	_____
<b>TECHNICAL ELECTIVES (0 - 2 credits - see last page for suggestions)</b>					
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
<b>CAPSTONE PROJECT REQUIREMENTS (5 credits – select one class from the list below. Generally follows all other classes.)</b>					
MFG T 229	Manufacturing Team Project	5	_____	_____	_____
ENGR 298	Interdisciplinary Design Project	5	_____	_____	_____

**MINIMUM REQUIRED CREDITS      90      Min 2.0 cum. GPA**

\* If you already have the certificate, these classes were embedded in the certificate and you don't need to take them.



# Principles of Precision Machining: Certificate

## GENERAL INFORMATION

The Principles of Precision Machining Certificate program is designed to provide students with the basic skills necessary to gain employment as machine operators. Students will be developing skills in applied machining including basic math, basic and advanced blueprint reading, conventional lathe and mill operations, small shop tools and operation, shop safety and teamwork. This certificate may be considered a stand-alone credential for people seeking to enter the Precision Machining field, or as part of a stackable set of certificates and degrees in the EvCC Advanced Manufacturing Program leading to a degree in Precision Machining.

There is a current need in Washington for more than 1,000 CNC operators. Graduates of this certificate program may work in companies of different sizes, from small shops to large aerospace companies. Indicators show the industry will remain strong beyond the year 2020.

## PROGRAM INFORMATION

The two- quarter program will focus on skills used in a modern machine shop. The first quarter focuses on machine shop math, blueprint reading, and conventional machine tool theory and lab. CNC is introduced. The second quarter builds upon skills gained in the first quarter, adds in geometric dimension and tolerance, applied math skills including geometry and trigonometry, and more CNC programming and operations.

## GETTING STARTED AT EVCC

Our Enrollment Services Office provides information about application, advising, orientation and registration for new and continuing students. All prospective students are invited to contact the Educational Planning Center if they would like to speak one-to-one with an educational planner. If students have questions about applying or getting started they may contact Enrollment Services. Contact:

- ◆ Enrollment Services, Parks Student Union, 425-388-9219  
admissions@everettcc.edu
- ◆ Educational Planning Center, Third Floor, Parks Student Union,  
425-388-9339

## Certificate: Principles of Precision Machining (40 Credits)

This checklist is targeted at students with an interest CNC operator and machinist. Courses have prerequisites. Upon enrollment, this checklist should be submitted with a diploma application to the Enrollment Services Office.

Student: \_\_\_\_\_ Advisor: \_\_\_\_\_ Date: \_\_\_\_\_

Course Number	Course Title	Credits	Quarter Planned	Quarter Done	Grade
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### REQUIRED COURSES

MFG T 104	Machine Operator 1	20	_____	_____	_____
MFG T 105	Machine Operator 2	20	_____	_____	_____

**TOTAL: 40 credits Minimum 2.0 GPA**

## COURSE INFORMATION

### MFG T 104 Machine Operator 1

This class will focus on applied machinist math including measurements, basic blue print reading, conventional lathe and mill operations, small shop tools operation and an introduction to CNC. Students are introduced to processes and procedures, and shop safety and teamwork.

### MFG T 105 Machine Operator 2

This course develops skills in advanced blueprint reading including understanding of Geometric Dimensioning and Tolerance; applied math skills including geometry and trigonometry; technical core skills in CNC Machine programming and operation are further developed.

## PROGRAM OUTCOMES

- Solve technical mathematical problems
- Read and understand basic engineering drawings
- Understand and utilize machine technology
- Write programs and setup CNC machines
- Operate and perform maintenance on CNC machines
- Document technical activities in written and verbal reports
- Be prepared for successful employment

## PROGRAM ADVISORS

For specific guidance about this certificate, contact:

- ◆ Terry Elmore, 425-388-9964 ext. 7374  
telmore@everettcc.edu

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# Manufacturing Pre-Employment Certificate

## GENERAL INFORMATION

The Manufacturing Pre-Employment certificate is a one-quarter program designed to prepare students to work at the entry level in a manufacturing facility and the aerospace industry.

This course serves as an introduction to manufacturing. The knowledge and skills acquired in this course are required for entry level positions in diverse workplace scenarios with special emphasis on aerospace. Content includes a survey of mechanical concepts, precision measurement, blueprint reading, quality assurance, workforce skills/communication, ergonomics, lean manufacturing, and sustainable business practices.

This certificate may be considered a stand-alone credential for people seeking to enter the manufacturing field, or as part of a stackable set of certificates and degrees in the EvCC Advanced Manufacturing Program.

## GETTING STARTED AT EVCC

Our Enrollment Services Office provides information about application, advising, orientation and registration for new and continuing students. All prospective students are invited to contact the Educational Planning Center if they would like to speak one-to-one with an educational planner. If students have questions about applying or getting started they may contact Enrollment Services. Contact:

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admissions@everettcc.edu
- ◆ Educational Planning Center, Third Floor, Parks Student Union, 425-388-9339

## PROGRAM CERTIFICATE OUTCOMES

- Understand and solve basic technical mathematical problems
- Communicate orally and in writing about technical activities
- Be prepared for successful employment
- Understand and work with entry level technical and mechanical systems
- Perform work using basic computer skills
- Meet industry requirements for safety and first aid

## PROGRAM ADVISOR

For specific guidance about this certificate, contact:

- ◆ Annette Floyd, 425-388-9562  
afloyd@everettcc.edu

## Certificate: Manufacturing Pre-Employment 12 Credits

This checklist is targeted at students with an interest in an entry level manufacturing systems and/or the aerospace industry. Upon enrollment, this checklist should be submitted with a diploma application to the Enrollment Services Office.

Student: \_\_\_\_\_ Advisor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Course Number	Course Title	Credits	Quarter Planned	Quarter Done	Grade
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### REQUIRED COURSES

MFG T 102	Manufacturing Employment Readiness	12			
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**TOTAL: 12 credits      Minimum 2.0 GPA**

**This certificate satisfies the requirements for HLTH 141/WELD 154 and Technical Electives of the Advanced Manufacturing ATA Degree.**

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## RECOMMENDED SEQUENCE OF COURSES

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The courses required for a degree have been listed below in a suggested sequence for students who start their classes in Summer or Winter, and who wish to complete a degree in two years. Note that the certificate is a subset of the degree, and classes should be scheduled accordingly. Students should make certain they have met or completed the prerequisites before enrolling in these classes. In general, these prerequisites are: 1) The Pre-Employment certificate; or 2a) DEVED 096 for students not familiar with computers, 2b) Math 070 to enroll in ENG T 101, and 2c) ENGL 097 to enroll in ENGL 098 – consult with an adviser if unsure. EvCC does not offer every course each quarter, so please consult a class schedule and an advisor to plan any custom course selections.

### SUMMER QUARTER START - FIRST YEAR

<i>Summer Quarter</i>		<i>Fall Quarter</i>		<i>Winter Quarter</i>		<i>Spring Quarter</i>	
<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>
MFG T 104	20	MFG T 105	20	ENG T 100	4	ENGR 114/ENG T 108	4
				CL 101	5	ENG T 102	5
				ENGL 098	5	HUMAN RELATIONS	5
Total	20	Total	20	Total	14	Total	14

### SUMMER QUARTER START - SECOND YEAR

<i>Summer Quarter</i>		<i>Fall Quarter</i>		<i>Winter Quarter</i>		<i>Spring Quarter</i>	
<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>
ELECTIVES		ENG T 105	4	ENG T 213	5		
If needed		MFG T 202	5	MFG T 229/ENGT 199	5		
		WELD 151	3				
Total		Total	12	Total	10	Total	

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### WINTER QUARTER START - FIRST YEAR

<i>Summer Quarter</i>		<i>Fall Quarter</i>		<i>Winter Quarter</i>		<i>Spring Quarter</i>	
<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>	<u>Course</u>	<u>Credit</u>
				MFG T 104	20	MFG T 105	20
Total		Total		Total	20	Total	20

### WINTER QUARTER START - SECOND YEAR

<i>Summer Quarter</i>		<i>Fall Quarter</i>		<i>Winter Quarter</i>		<i>Spring Quarter</i>	
<u>Course</u>	<u>credit</u>	<u>Course</u>	<u>credit</u>	<u>Course</u>	<u>credit</u>	<u>Course</u>	<u>credit</u>
ENGL 098	5	ENG T 100	4	ENGR 114/ENG T 108	4	ENG T 105	4
ELECTIVES		CL 101	5	MFG T 202	5	ENG T 213	5
If needed		HUMAN RELATIONS	5	ENG T 102	5	MFG T 229/ENGR 298	5
				WELD 152	3		
Total	5	Total	14	Total	17	Total	14

## GRADUATION

In order to receive the actual certificate or degree in a timely fashion, students are encourage to apply for graduation 12 weeks before they have completed their class work. Typically, this means the application process should be undertaken near the beginning of the quarter preceding the student's last quarter in school. The documents needed are as follows:

1. The graduation application form, which is available on the EvCC web site. The student fills this out and signs it.
2. The curriculum guide (page 2 or 3 or 4), which is available on the EvCC web site. The student fills out the dates and grades for all classes taken and the projected dates for those not yet taken. The student and the faculty adviser sign this document.
3. If any classes listed on the curriculum guide were waived or substituted, the Waiver and Substitution form must be filled out. See your faculty adviser to obtain a copy of this document. The student, faculty adviser, and the division dean sign this document.

When these documents have been filled out and signed, the student should then make a copy of them for their records, and then submit the original documents to Enrollment Services.

## DEGREE ELECTIVES

You may complete elective credits to satisfy the ATA degree requirements in this program. These should be technical in nature, but need not be if your selection enhances your ultimate employability. Any college level English course, for example, would enhance your communication skills and be considered acceptable. Please browse through the college catalog and examine the wide variety of courses offered at EvCC. The following list is presented for your convenience and represents some of the more commonly selected elective courses.

### **COMPOSITES TECHNOLOGY**

CT 161	Materials and Processes
CT 202	Composites
CT 120	Composite Fabrication
CT 125	Composite Assembly
CT 130	Composite Repair
CT 145	Composite Special Projects

### **WELDING/FABRICATION TECHNOLOGY**

WELD 111	Basic Layout
WELD 151	Carbon Steel Metallurgy for the Trades
WELD 152	Welding Base Materials: Processes & Procedures
WELD 153	Non-Ferrous Metallurgy for the Trades
WELD 191	Basic Arc
WELD 192	Advanced Arc
WELD 193	Basic Pipe
WELD 194	Gas Tungsten Arc Welding (TIG)
WELD 195	Gas Metal Arc/Flux Core Arc Welding
WELD 210	Heavy Plate Fabrication
WELD 211	Sheet Metal Fabrication
WELD 212	Pipefitting & Pipe Systems Fabrication
WELD 213	Practical Fabrication & Adv. Welding Techniques
WELD 214	Sub-Arc Welding
WELD 215	Press Brake
WELD 216	Advanced Tig Welding
WELD 225	Welding Skills Building
WELD 285	CNC Plasma Cutting
WELD 295	Work Experience Internship

### **ENGLISH COURSES**

You may select any English course, ENGL& 101 or higher, or any Communications course (CMST).

### **HUMAN RELATIONS (R)**

You may take any human relations course listed on Page 2

### **INTERNSHIP**

MFG T 171  
MFG T 172

### **Technical Design (CAD)**

ENG T 203	Intermediate AutoCAD
ENG T 259	Engineering Graphics (SolidWorks II)
ENG T 185	Introduction to Catia
ENG T 193	Intermediate Catia
ENG T 217	CAD Projects

### **OTHER SUGGESTIONS**

BT 100	Beginning Keyboarding
ACCT 110	Small Business Accounting
BUS& 101	Introduction to Business
BT 162	Job Search & Professional Development
BT 242	Excel
BT 243	Advanced Excel
CS 117	Intro to Computer Networking
ECON 101	Understanding Economics
ENG T 104	Electro-mechanical Blueprint Reading
ENGR& 104 [OR BUS 102]	Introduction to Design
ENVS 150	Land Use Planning & Regulation
GRAPH 100	Intro to Digital Studio
GEOG 205	Physical Geography with GIS, GPS, and Remote Sensing labs
GIS 200	Introduction to Computer Cartography
GIS 201	Introduction to Geographic Information Systems
GIS 205	Applications in Geographic Information Systems
GIS 250	Internship in Geographic Information Systems
GIS 299	Independent Study – Visual Basic for GIS
GRAPH 110	Digital Illustration I
GRAPH 113	Digital Illustration II
PHOTO 110	Photography I: Basic Elements

### **MATHEMATICS COURSES**

You may select any Math course, Math 080 or higher. Math 095 and Math 105 are particularly recommended for the CAD degree.

### **SCIENCE COURSES**

You may select any physics, chemistry, or engineering course

### **BUSINESS COURSES**

You may select any business course

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