

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 Composites 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 – Composites Program is part of a cluster of programs. Four **Associate in Technical Arts degrees** and nine **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:

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

Certificate Programs:

- **Manufacturing Pre-Employment**
 - **Aerospace Composites Technician**
 - **Precision Machining***
 - **Engineering Technology (CAD) ***
 - **CATIA 3D Experience ***
 - **Welding and Fabrication ***
 - **Mechatronics ***
 - **Introduction to Composites**
 - **Introduction to Robotics ***
- * 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 (such as fiber resin ratio)
- Learn basic hand skills for the layup of composite materials using fiberglass, carbon fiber, epoxy and polyester resin
- Design molds and forms for the layup of fiber glass and carbon fiber materials
- Build and vacuum bag composite materials for room temperature cure and oven cure materials
- Create projects in composite materials showing how surface energy is increased and decreased
- Design for producibility and manufacturing ease
- Document technical activities in written and verbal reports
- Be prepared for successful employment

CREDIT FOR PRIOR LEARNING

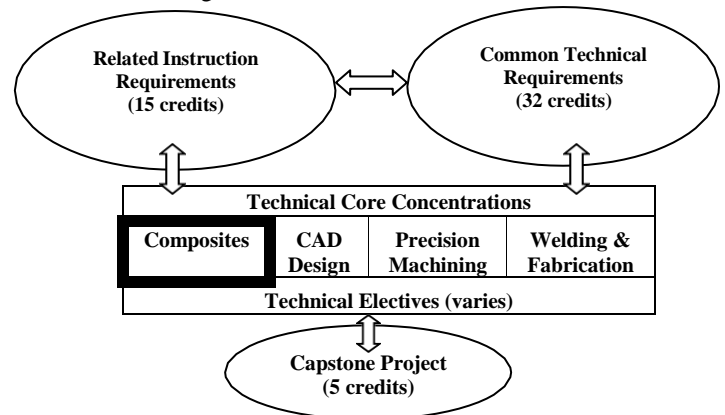
Adults with work experience or completion of industry training programs may be eligible for college credit by following “External Credit” evaluation procedures. Students currently in high school may take selected technical courses while in high school and apply at that time for college credit.

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

Tech Prep: www.everettcc.edu/techprep
Or contact your high school counselor

THE COURSES

The courses for this program may be divided into four categories: Related Instruction requirements (15 credits), common technical requirements (32 credits), technical core concentration classes (28-40 credits), technical electives (credit varies) 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 28-40 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:

Advising Center	425-388-9339
Enrollment Services	425-388-9219
Precision Machining (Darin Chase)	425-388-9390
CAD (David Primacio)	425-267-0160
CAD (Sean Auger)	425-388-9534
Welding (Robert White)	425-388-9457
Welding (Karl Fulton)	425-388-9447
Composites (Michael Patching)	425-388-9092
Mechatronics (Ken Ackerman)	425-388-9290

ATA Degree: Advanced Manufacturing Tech – Composites

92 credits

The courses required for an **Associate in Technical Arts Degree in Advanced Manufacturing Tech – Composites** 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, a cumulative GPA of 2.0 or higher must be maintained.

Student Name: _____ Advisor Signature: _____ Date: _____

COMPLETION of Diversity Course (BUS 110D, ENGL 098D or ENGL& 101D suggested):

<u>Course Number</u>	<u>Course Title</u>	<u>Credits</u>	<u>Quarter Planned</u>	<u>Quarter completed</u>	<u>Grade</u>
RELATED INSTRUCTION (15 credits)					
ENG T 101 (or MATH 086 or higher)	Introduction to Graphics and Measurements	5	_____	_____	_____
ENGL 098/098D or ENGL& 101/101D	Intro to College Writing or English Composition I	5	_____	_____	_____
BUS 110D, BUS 165, CMST& 210, CMST& 230	Human Relations (R) course from this group Business 110D Recommended	5	_____	_____	_____
COMMON TECHNICAL REQUIREMENTS (32 credits)					
MFG T 100	Preparation for Success and Safety in Industry	5	_____	_____	_____
CT 101*	Introduction to Composites	5	_____	_____	_____
MFG T 117	Blueprint Reading and Schematics	3	_____	_____	_____
ENG T 100, or 108, or 185	Engineering Graphics: Intro to CAD	4	_____	_____	_____
MFG T 101 or MFG T113	Introduction to Machining	5	_____	_____	_____
WELD 101 or higher	Introduction to Welding	5	_____	_____	_____
MECH 119 or higher	Introduction to Robotics	5	_____	_____	_____
COMPOSITES TECHNICAL CORE REQUIREMENTS (40 credits)					
CT 102	Composite Technology 1	20	_____	_____	_____
CT 203	Composite Technology 2	20	_____	_____	_____
TECHNICAL ELECTIVES (0) credits minimum – see last page for suggestions					
MFG T 102 (recommended)	Manufacturing Employment Readiness	12	_____	_____	_____
CAPSTONE PROJECT REQUIREMENTS (5 credits – select one class from the list below. Generally follows all other classes.)					
MFG T 229 or MFG T 230	Manufacturing Team Project	5	_____	_____	_____
MINIMUM REQUIRED CREDITS		92	Min 2.0 cumulative GPA		

* If you already have the composites certificate, this class was embedded in the certificate and you don't need to take it. Additionally, the following courses may be substituted for CT 101: MFG T 107, 113 or 202.

Interested in transferring to a university?

Students completing this ATA degree can transfer directly to the Information Technology and Administrative Management (ITAM) program at Central Washington University or to the Manufacturing Operations program at Clover Park Technical College to pursue a Bachelor of Applied Science (BAS) degree. Go to www.cwu.edu/it-management/bas-overview or www.cptc.edu/programs/basmo for more information.

Everett Community College does not discriminate based on, but not limited to, race, color, national origin, citizenship, ethnicity, language, culture, age, sex, gender identity or expression, sexual orientation, pregnancy or parental status, marital status, actual or perceived disability, use of service animal, economic status, military or veteran status, spirituality or religion, or genetic information in its programs, activities, or employment. The Title IX Coordinator has been designated to handle inquiries regarding nondiscrimination policies and can be reached at 2000 Tower Street, Everett, WA 98201, TitleIXCoordinator@everettcc.edu, or 425-388-9271. This publication is effective **SEPT 2020**. The College reserves the right to change courses, programs, degrees and requirements. It is the student's responsibility to be aware of correct information by routinely checking with Enrollment Services and/or the advisors listed in this publication. Requirements applicable to all certificates and degrees are published in the College Catalog. Nothing contained herein shall be construed to create any offer to contract or any contractual rights. For more information, call 425-388-9219, Everett Community College, 2000 Tower Street, Everett, WA 98201, www.everettcc.edu

Aerospace Composite Technician Certificate

GENERAL INFORMATION

The Aerospace Composite Technician certificate is a two-quarter program designed to prepare students to fabricate, assemble, and repair composite materials on aircraft and in the composite industry. The knowledge and skills gained through this program are those required for entry-level positions as composite technicians. The certificate also provides an opportunity for existing aircraft mechanics and service technicians to expand their education in the field of composite assembly and repair.

PROGRAM INFORMATION

The two-quarter program will focus on skills used in advanced composite manufacturing. The first quarter focuses on building a strong knowledge base of terminology, material handling and practices, and the foundational techniques used in industry. The second quarter builds upon the skills gained in the first quarter, adds in mold manufacturing techniques, CNC tooling construction, fastening, bonding and assembly operations, inspection and repair.

PROGRAM ADVISOR

For specific guidance about this certificate, contact:

- ◆ Michael Patching, 425-388-9092, mpatching@everettcc.edu

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
- ◆ Advising Center, Rainier Hall Room 108, 425-388-9339

COURSE INFORMATION

CT 102 Composite Technology 1

Theory and application of composite manufacturing principles; knowledge of material types and resin systems; curing and cross linking of polymer resin systems; design considerations to construct laminates and sandwich core construction; knowledge and use of layup techniques using both open and closed molding methods to include wet layup, filament winding, vacuum bagging, resin infusion process (VARTM), light resin transfer modeling (LRTM); understand and use of core material properties; use of precision measuring tools to finish cured composites to blue print specifications; understand and demonstrate material handling and shop safety practices.

CT 203 Composite Technology 2

Theory and application of advanced composite manufacturing principles; the course will focus on the knowledge of mold manufacturing techniques; tooling, bonding and fastener application; damage inspection and repair.

PROGRAM OUTCOMES

- Solve technical mathematical problems (such as fiber resin ratio)
- Learn basic hand skills for the layup of composites materials using fiberglass, carbon fiber, epoxy and polyester resin
- Design molds and forms for the layup of fiberglass and carbon fiber materials
- Build and vacuum bag composite materials for room temperature cure and oven cure materials
- Create projects in composite materials showing how surface energy is increased and decreased
- Design for producibility and manufacturing ease
- Document technical activities in written and verbal reports
- Be prepared for successful employment

Certificate: Aerospace Composite Technician (40 Credits)

This checklist is targeted at students with an interest in Composite Technology. Courses have prerequisites. 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	Qtr Planned	Qtr Completed	Grade
CT 102	Composite Technology 1	20	_____	_____	_____
CT 203	Composite Technology 2	20	_____	_____	_____
TOTAL:		40 credits		Minimum 2.0	minimum GPA

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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. 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
- ◆ Advising Center, Rainier Hall Room 108, 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

For specific guidance about this certificate, contact:

- ◆ Advanced Manufacturing Training & Education Center (AMTEC) 425-388-9570, mfg@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 Complete	Grade
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REQUIRED COURSE:

MFG T 102	Manufacturing Employment Readiness	12	_____	_____	_____
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TOTAL: 12 credits

Minimum 2.0 GPA

This certificate satisfies the requirements MFG T 100 and Technical Electives of the Advanced Manufacturing ATA Degree.

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GENERAL INFORMATION

The Aerospace Composites Foundations certificate is a one-quarter program designed as a general introduction to composite materials, manufacturing processes, and safety standards. The course of study is designed to prepare students to work at the entry level in a composite manufacturing facility and the aerospace industry.

This course serves as an introduction to advanced composite manufacturing. The course is recommended for anyone seeking to understand the basics of advanced composites materials and structures, material forms, processes, layup/lamination, vacuum bagging, proper handling and safety, and adhesive bonding. Students will perform hands-on exercises to promote learning and to build skills required by industry.

This certificate may be considered a stand-alone credential for people seeking to enter the composite manufacturing field, or as the first level of a stackable set of certificates in the degree pathway of the Advanced Manufacturing Tech – Composites Associate in Technical Arts degree.

PROGRAM CERTIFICATE OUTCOMES

- Solve technical mathematical problems (such as fiber resin ratio)
- Learn basic hand skills for the layup of composites materials using fiberglass, carbon fiber, epoxy and polyester resin
- Design molds and forms for the layup of fiberglass and carbon fiber materials
- Build and vacuum bag composite materials for room temperature cure and oven cure materials
- Document technical activities in written and verbal reports
- Be prepared for successful employment

PROGRAM ADVISOR

For specific guidance about this certificate, contact:

- ◆ Michael Patching, 425-388-9092
mpatching@everettcc.edu

Certificate: Aerospace Composites Foundations 5 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

CT 101	Introduction to Composites	5			
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TOTAL: 5 credits

Minimum 2.0 GPA

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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.

MANUFACTURING TECHNOLOGY

MFG T 102	Manufacturing Employment Readiness
MFG T 104	Machine Operator I
MFG T 105	Machine Operator II
MFG T 113	CNC Cutting Solutions
MFG T 202	Lean and Operations Management

WELDING/FABRICATION TECHNOLOGY

WELD 111	Basic Layout
WELD 150	Blueprint Reading for Industry
WELD 151	Carbon Steel Metallurgy for the Trades
WELD 152	Welding Base Materials: Processes & Procedures
WELD 153	Non-Ferrous Metallurgy for the Trades
WELD 190	Oxyacetylene
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 196	Flux Core Arc Welding
WELD 210	Heavy Plate Fabrication
WELD 211 or	Sheet Metal Fabrication or
WELD 217	Aerospace Sheet Metal Fabrication
WELD 212	Pipefitting & Pipe Systems Fabrication
WELD 213	Practical Fabrication & Adv. Welding Techniques
WELD 214	Sub-Arc Welding
WELD 216	Advanced Tig Welding
WELD 225	Welding Skills Building
WELD 285 or	CNC Plasma Cutting or
WELD 286	Aerospace 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 100	Introduction to Engineering Graphics and 2D AutoCAD
ENG T 103	Introduction to Revit
ENG T 196	Advanced Workbenches with CATIA v5 Intermediate
ENG T 203	AutoCAD
ENG T 259	Engineering Graphics (SolidWorks II)
ENG T 193	Intermediate Catia
ENG T 217	CAD Projects

OTHER SUGGESTIONS

ACCT 110	Small Business Accounting
BT 100	Beginning Keyboarding
BUS& 101	Introduction to Business
BT 162	Job Search & Professional Development
BT 242	Excel
BT 243	Advanced Excel
IT 117	CCNA 1: Introduction to Networking
ECON 101D	Understanding Economics
ENG T 104	Electro-mechanical Blueprint Reading
ENGR& 104 [OR BUS 102]	Introduction to Design
ENVS 150	Land Use Planning & Regulation
GEOG 205	Physical Geography with GIS, GPS, and Remote Sensing labs
GRAPH 100	Intro to Digital Studio
GRAPH 110	Foundations of Graphic Design
GRAPH 113	Graphic Design and Typography
PHOTO 110	Photography I: Basic Elements

MATHEMATICS COURSES

You may select any math course; MATH 086 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