

Advanced Manufacturing Certificates



at Flathead Valley Community College

The advanced manufacturing stackable credentials were designed with extensive input from community manufacturers to train and prepare students for good-paying jobs in the booming advanced manufacturing industry.



Stackable one-semester credentials offer students multiple “on and off” ramps, providing opportunities to build on existing skills or develop new skills from a foundational level.

Tiers I and II initiate communication, critical thinking, and technical skills. Tier III provides advanced skills in the respective areas. The Tier IV capstone semester will be a project-oriented program with elements of design, redesign, fabrication and advanced experiences involving equipment. The Firearms Technology certificate is a specialty add-on program to the machining curriculum and requires an application for acceptance into the program.

Except for those in the Firearms Technologies program, courses are offered in both a traditional face-to-face, as well as a hybrid (online and on-campus) format.

Students have the opportunity to obtain:

- **One-semester Certificate of Technical Science; or**
- **Two-semester Certificate of Applied Science; or**
- **Two-year Associate of Applied Science degree.**

VISIT

www.fvcc.edu/advancedmanufacturing.html



Machinist Technician

- Teaches theory, operation and programming of manual and CNC mills and lathes.
- Covers problem-solving, precision measurement, quality control and machining operations skills.
- Introduces students to machining materials and Solidworks and MASTERCAM CAD/CAM software.
- Tiers I and II of this program teach the skills necessary to pursue an entry-level career as an industrial machine operator. Tiers III and IV build upon the operator’s skill set to develop advanced production skills in mill, lathe, CNC, mill-turn systems and fabrication.

Firearms Technology

- Built to augment a machining background for a career in firearms production.
- Two-semester certificate program requires an application approval process. Visit www.fvcc.edu for application process and requirements.
- Covers theory, bench metal techniques, machine tools for firearms, precision rifle building, and firearms repair.

Industrial Maintenance

- Prepares students for jobs in repair and construction support for manufacturing and other industries that include mechanical processes as part of daily operations.
- Industrial mechanics employ a wide range of skills including welding, machining, carpentry and electrical knowledge to maintain mechanical systems.
- Field has experienced substantial growth and is projected to grow at above average rates over the next 10 years.

Electronics Technician

- Teaches fundamentals ranging from introductory electrical skills to advanced-level electronics technician skills.
- Includes theoretical instruction and hands-on labs with electrical circuits, advanced electronics including controllers and the machine/system interface.
- Emphasizes mathematical skills for design and analysis at all levels of circuitry and system controls.
- Covers programmable Logic Controls, electric meters and motors, applied physics, digital and solid state electronics.

Electronics Technician Tier I

Fall Semester

Course#	Title	Credits
CAPP 106*	Short Courses: Computer Applications	1
or		
CAPP 114	Short Courses: MS Word	1
or		
CAPP 116	Short Courses: MS Excel	1
ECP 104	Workplace Safety	1
ELCT 100	Introduction to Electricity	3
ELCT 110	Basic Electricity I	5
ELCT 137	Electrical Drafting	2
M 114*	Extended Technical Mathematics	3
MCH 101	Intro to Manufacturing Processes	1

Semester Total 16

*Indicates prerequisite and/or corequisite required; check course description.

Electronics Technician Tier II

Spring Semester

Course#	Title	Credits
BMGT 205C	Professional Business Communication	
or		
COMX 115C	Intro. to Interpersonal Communications	3
ELCT 102*	Electrical Fundamentals II	4
ELCT 111	Electric Meters and Motors	3
ETEC 130	Panel Wiring and Soldering	2
PHSX 110*	Applied Physics	4

Semester Total 16

CAS Total Credits 32

*Indicates prerequisite and/or corequisite required; check course description.

Machinist Technician Tier I

Fall Semester

Course#	Title	Credits
ECP 104	Workplace Safety	1
M 111*	Technical Mathematics	3
MCH 101	Intro to Manufacturing Processes	1
MCH 120	Blueprint Reading & Int. Mach.	3
MCH 129	Machine Quality Control and Precision Measurements	3
MCH 132	Introduction to Engine Lathes	4
MCH 134	Introduction to Mills	4

Semester Total 19

*Indicates prerequisite and/or corequisite required; check course description.

Machinist Technician Tier II

Spring Semester

Course#	Title	Credits
BMGT 205C	Professional Business Communication	
or		
COMX 115C	Intro to Interpersonal Communication	3
DDSN 135	Solidworks	2
MCH 102	Intro. to Manufacturing Materials	2
MCH 122	Introduction to CAM	3
MCH 125*	Intro to CNC Lathe Operations	3
MCH 127*	Intro to CNC Mill Operations	3
MFGT 115	Machine Shop Fundamentals	2

Semester Total 18

CAS Total Credits 37

Industrial Maintenance Tier I

Fall Semester

Course#	Title	Credits
ECP 104	Workplace Safety	1
ELCT 100	Introduction to Electricity	3
M 111*	Technical Mathematics	3
MCH 101	Intro. to Manufacturing Processes	1
MCH 120	Blueprint Reading & Int. Mach.	3
MCH 129	Machine Quality Control and Precision Measurements	3
MCH 132*	Introduction to Engine Lathes	4

Semester Total 18

*Indicates prerequisite and/or corequisite required; check course description.

Industrial Maintenance Tier II

Spring Semester

Course#	Title	Credits
BMGT 205C	Professional Business Communication	
or		
COMX 115C	Intro to Interpersonal Communication	3
CAPP 106*	Short Courses: Computer Applications	
or		
CAPP 114	Short Courses: MS Word	
or		
CAPP 116	Short Courses: MS Excel	1
CSTN 125	Basic Cabinetry and Furniture Making	3
ELCT 111	Electric Meters and Motors	3
MCH 102	Intro to Manufacturing Materials	2
WLDG 111*	Welding Theory I Practical	4

Semester Total 16

CAS Total Credits 34

Electronics Technician Tier III

Fall Semester

Course#	Title	Credits
ELCT 210*	Advanced Current Theory	5
ELCT 250	Programmable Logic Controllers	4
ETEC 245*	Digital Electronics	4
ETEC 250*	Solid State Electronics I	4

Semester Total **17**

*Indicates prerequisite and/or corequisite required; check course description.

Electronics Technician Tier IV

Spring Semester

Course#	Title	Credits
BMGT 205C*	Professional Business Communication	
or		
COMX 115C	Intro to Interpersonal Communication	3
ELCT 211*	AC Measurements	3
ETEC 280*	Advanced Electronics	4
ETEC 285*	Adv. Programmable Controllers	4
ETEC 299*	Capstone: Electronics	3

Semester Total **17**

AAS Degree Total Credits **66**

*Indicates prerequisite and/or corequisite required; check course description.

Machinist Technician Tier III

Fall Semester

Course#	Title	Credits
MCH 220*	Geometric Dimensioning and Tolerancing	3
MCH 221*	Advanced Manual Mill	3
MCH 222*	Advanced CNC Mill Operations	3
MCH 225	Machinery's Handbook	3
MCH 226*	Advanced CAD/CAM	4

Semester Total **16**

*Indicates prerequisite and/or corequisite required; check course description.

Machinist Technician Tier IV

Spring Semester

Course#	Title	Credits
BMGT 205C*	Professional Business Communication	
or		
COMX 115C	Intro to Interpersonal Communication	3
MCH 227*	Swiss CNC and Mill-Turn Systems	4
MCH 223*	Advanced Manual Lathe	3
MCH 224*	Advanced CNC Lathe Operations	3
MCH 299*	Capstone: Machinist	3

Semester Total **16**

AAS Degree Total Credits **69**

*Indicates prerequisite and/or corequisite required; check course description.

Firearms Technology Certificate

Fall Semester

Course #	Title	Credits
FT 100	Introduction to Firearms	1
FT 111	Firearms Theory I	3
FT 120	Bench Metal Techniques	3
FT 131	Firearms Repair I	3
MCH 132	Introduction to Engine Lathes	4

First Semester Total **14**

Spring Semester

Course#	Title	Credits
FT 112*	Firearms Theory II	3
FT 125*	Machine Tools for the Gunsmith	4
FT 132*	Firearms Repair II	3
FT 140*	Precision Rifle Building	3

Second Semester Total **13**

Total Credits **27**

*Indicates prerequisite and/or corequisite required; check course description.



Opportunities After Graduation

Employers in the industry are ready to hire trained technicians. The need for skilled workers will continue to grow as Montana's advanced manufacturing industry is expecting significant job growth over the next 10 years.

Electronics

In Flathead County, employment opportunities in electronics manufacturing have grown over 70% since 2006. Typical wages for electronics technicians are above average in the state and nationally. In Montana, the median wage is \$29.21 per hour (2012).*

The electronics industry continues to change and expand providing opportunities for personal and professional growth.

**onetonline.org #49-2094 Electrical and Electronics Repair*

Machining

Many opportunities exist for entry-level machinists and manufacturing technicians. Industries such as semiconductor machinery manufacturing, machine shops, and small arms manufacturing have all seen employment growth in recent years. Flathead manufacturing employment grew by 7.7% in 2012*.

Growth in the manufacturing industry and the need to replace an aging workforce will provide opportunities for graduates. In Montana, employment of CNC machinists is projected to increase by 44% between 2010 and 2020. Nationally, employment is projected to increase by 19.2% over the same period. Both state and national projected employment growth exceeds the rate of overall projected employment growth.

**onetonline.org #51-401 Machinists*

Industrial Maintenance

Large-scale manufacturing, energy generation, petroleum refining, chemical processing, and wood products all employ mechanical systems that require maintenance. This program provides students with the necessary instruction to meet the wide range of topics encountered in industry by maintenance personnel.

Industrial maintenance is projected to grow 22% between 2010 and 2020 in Montana. Machinery mechanics can earn approximately \$24.23 per hour in Montana (2012 median).

**onetonline.org #49-9041 Industrial Machinery Mechanics*



Firearms Technology

Firearms production industry leaders have indicated machinists with entry-level firearms knowledge and experience will meet the qualifications of positions available in the local firearms production industry. Students who are new to machining should consider the machining Tiers I and II prior to applying for the firearms technology program. Small arms manufacturing has grown from 38 workers to 240 workers in 2012 in Flathead County.*

**bls.gov Quarterly Census of Employment and Wages*



www.RevUpMontana.com

For occupation information, tuition and fees, and other gainful employment disclosures, visit our website at www.fvcc.edu/gainfulemployment.html.

"Amplifying Montana's Advanced Manufacturing and Innovation Industry"
#TC-23760-12-60-A-30

"Strengthening Workforce Alignment in Montana's Manufacturing and Energy Industries"
#TC-25034-13-60-A-30

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www.fvcc.edu

www.fvcc.edu/advancedmanufacturing.html

The program information provided applies to the 2015-2016 Flathead Valley Community College academic catalog.

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