

ADVANCED MANUFACTURING AND DESIGN, ADVANCED MANUFACTURING AND 3D PROTOTYPING - CERTIFICATE



ETCA

To enroll in this certificate program, students must have successfully completed the Manufacturing and Design certificate concentration (ETCI). See Manufacturing and Design (<https://catalog.ccri.edu/programs-study/physics-engineering/engineering-systems-technology-certificate-introduction-cnc-manufacturing-concentration/>) for more information.

Today modern manufacturing depends upon the use of computers, robots, CNC and 3D-printing technology and digital technology and PLCs. This program builds on the basic skills and knowledge developed in the Manufacturing and Design certificate (ETCI). The certificate will increase CNC programming skills and introduce the concepts of rapid prototyping, digital direct manufacturing and the use of 3D-laser scanning and 3D-printing. The courses will make extensive use of 3D-modeling with SolidWorks, tool control with G and M codes and MasterCam. Students will also develop a basic understanding of digital systems and the programming of PLCs. The final course is a capstone course, requiring 140 hours of an industry practicum or internship.

The certificate can be completed in one spring semester and one summer session. The accelerated version requires attending classes four days a week. The combination of the two certificates, ETCI and ETCA, can be applied toward the Advanced Manufacturing and Design A.S. degree without a loss of credit.

Note: Many courses require prerequisites, corequisites and/or testing. See course descriptions for details (<https://catalog.ccri.edu/course-descriptions/>).

Program Learning Outcomes

Upon completion of this program, a student will be able to:

1. Ability to quantitatively analyze technical problems, and produce a solutions.
2. Ability to program PLC devices
3. Ability to construct a logical flow process
4. Ability to utilize Master Cam for CNC programming
5. Ability to plan and execute CNC projects
6. Ability to translate Solidworks and Mastercam files to 3D printing
7. Ability to plan and execute a rapid prototype project
8. Ability to apply CNC skills to an internship experience
9. Ability to troubleshoot a manufacturing process
10. Ability to produce a complete internship report

Certificate Requirements

Code	Title	Hours
AEES 1030	Introduction to Digital Systems	3
AEES 1060	Robotics and Control	3
ETCN 2100	Computer Aided Manufacturing ¹	3
ETCN 2200	CNC Machining II ¹	3
ETCN 2300	3D-Modeling and Prototyping	3
ETCN 2500	Computer Numerical Control (CNC) Practicum/ Capstone [^]	4
Subtotal		19
Total Hours		19

¹ Seven-week course

[^] Work-based learning course

Recommended Course Sequence (Accelerated Version)

Course	Title	Hours
Year 1		
Semester 1		
Spring semester:		
AEES 1030	Introduction to Digital Systems	3
AEES 1060	Robotics and Control	3
ETCN 2100	Computer Aided Manufacturing ¹	3
ETCN 2200	CNC Machining II ¹	3
ETCN 2300	3D-Modeling and Prototyping	3
Hours		15
Summer Session		
ETCN 2500	Computer Numerical Control (CNC) Practicum/ Capstone [^]	4
Hours		4
Total Hours		19

¹ Seven-week course

[^] Work-based learning course