ADVANCED MANUFACTURING AND DESIGN - ASSOCIATE IN SCIENCE

ETMA

Modern advanced manufacturing has been revolutionized by the use of computers for design, machining and automation. Today almost all product and component design uses computer-aided design (CAD) and computer-aided manufacturing (CAM) programs. The manufacturing process uses computers to control all aspects of subtractive and additive manufacturing (3-D printing). Computer numerical control (CNC) machining is at the heart of advanced manufacturing and the production of complex components accurately and efficiently. Advanced manufacturing also uses computers to control materials, inspection, quality assurance and distribution of finished products.

This program will provide students with extensive hands-on laboratory experience, and the basic skills and knowledge for employment in a variety of advanced manufacturing positions. The program will cover areas of science and mathematics and their applications to machining practices and CNC programming, and places emphasis on both theoretical and practical phases of the design, cost, quality and production of machined parts.

This associate degree is linked to two certificate tracks: Manufacturing and Design (ETCI) and Advanced Manufacturing and 3D-Prototyping (ETCA). Students can start their studies with one or more of the certificates or have all credits apply to the associate degree. The degree path requires prerequisites of Foundations of College Algebra (MATH 0101) and College Writing (ENGL 1005). Full-time students can expect to complete this program in five semesters.

Program Learning Outcomes

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

1. Effectively communicate in technical and non-technical environments.
2. Function effectively as a member or leader in a technical team.
3. Interpret and create mechanical blueprints to industry standards and utilize the Machinery's Handbook.
4. Operate, setup, and program manual and CNC machines to print specifications.
5. Utilize CAD/CAM in applications of engineering graphics and mechanical design.
6. Apply subtractive and additive (3D-printing) manufacturing for rapid prototyping.
7. Code PLCs and micro controllers for networking and system control applications.

Requirements

Code	Title	Hours
General Education Requirements		
COMM 1010	Communication Fundamentals^ HUMN; Non-Written Communications; Social and Professional Responsibilities	3
ENGL 1010	Composition I (or ENGL 1010A) HUMN; Written Communications; Information Literacy	3
MATH 1179	Applied Technical Mathematics I MSCI: Scientific Reasoning; Quantitative Literacy	3
MATH 1181	Applied Technical Mathematics II MSCI; Scientific Reasoning; Quantitative Literacy	3
PHYS 1000	Physics of Everyday Life MSCI; Critical Thinking; Quantitative Literacy	4
Social Science Elective (https://catalog.ccri.edu/academic-information/general-education/course-attributes/#sscigened/) SSCI		3
Social Science Elective (https://catalog.ccri.edu/academic-information/general-education/course-attributes/#sscigened/) SSCI		3
Subtotal		22
Core Requirements		
AEES 1030	Introduction to Digital Systems	3
AEES 1060	Robotics and Control	3
AEES 2020	Automation Systems	3
ENGR 1030	Engineering Graphics	3
ENGT 2090	Advanced Solid Modeling	3
ETCN 1100	Blueprint Reading and the Machinery's Handbook [1]	3
ETCN 1200	Precision Measurement and Geometric Dimensioning and Tolerance [1]	3
ETCN 1300	CNC Machining I	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
ETME 1020	Introduction to Manufacturing Processes	3
Subtotal		40
Total Hours		**62**

[1] Seven-week course

^ Work-based learning course

Recommended Course Sequence

Course	Title	Hours
Prerequisites		
ENGL 1005	College Writing (or take ENGL 1005A and ENGL 1010A)	3
MATH 0101	Foundations of College Algebra	4
	Hours	**7**
	Total Hours	**7**

Course	Title	Hours
Year 1		
Semester 1		
ENGL 1010	Composition I (or ENGL 1010A)	3
ENGR 1030	Engineering Graphics	3
ETME 1020	Introduction to Manufacturing Processes	3
MATH 1179	Applied Technical Mathematics I	3
PSYC 1050	Psychology in the Workplace	3
	Hours	**15**

Semester 2		
ENGT 2090	Advanced Solid Modeling	3
ETCN 1100	Blueprint Reading and the Machinery's Handbook [1]	3
ETCN 1200	Precision Measurement and Geometric Dimensioning and Tolerance [1]	3
ETCN 1300	CNC Machining I	3
MATH 1181	Applied Technical Mathematics II	3
	Hours	**15**
Year 2		
Semester 1		
AEES 1030	Introduction to Digital Systems	3
AEES 1060	Robotics and Control	3
COMM 1010	Communication Fundamentals^	3
ETCN 2100	Computer Aided Manufacturing [1]	3
ETCN 2200	CNC Machining II [1]	3
	Hours	**15**
Semester 2		
AEES 2020	Automation Systems	3
ETCN 2300	3D-Modeling and Prototyping	3
ETCN 2500	Computer Numerical Control (CNC) Practicum/ Capstone^ [2]	4
PHYS 1000	Physics of Everyday Life	4
General Education Elective (https://catalog.ccri.edu/academic-information/general-education/courses-approved-general-education-credits/)		3
	Hours	**17**
	Total Hours	**62**

[1] Seven-week course

[2] ETCN 2500: Practicum/Capstone can be taken in Summer Session

^ Work-based learning course