MANUFACTURING ENGINEERING TECHNOLOGY - MICROELECTRONIC MANUFACTURING, BACHELOR OF APPLIED SCIENCE

Curriculum Code #9601

Effective May 2026

Division of Engineering, Business and Information Technologies (http://catalog.lorainccc.edu/academic-programs/engineering-business-information-technologies/)

The Manufacturing Engineering Technology - Microelectronic Manufacturing program prepares individuals to apply engineering principles and technical skills to design, assembly, prototyping, and manufacturing of printed circuit boards (PCB) used in electronic hardware production. Includes hands-on machine operation of equipment used in high volume electronic assembly, use of software for designing PCB layout and bills of materials, programming and operation of automated PCB manufacturing equipment with surface mount technology, quality control principles including lean and six sigma, in-circuit test fixture design, test engineering, and engineering analysis of the physical design and electronic function of electronic hardware containing digital microcontrollers, analog circuitry, and MEMS sensors.

First Year		
Fall Semester		**Hours**
ELCT 111	ELECTRICAL CIRCUITS I [1]	3
ELCT 115	FABRICATION PROCESS FOR ELECTRONICS	2
MTHM 155	TECHNICAL MATHEMATICS I [1]	4
MEMS 122	INTRODUCTION TO MICRO-ELECTROMECHANICAL SYSTEMS (MEMS)	4
MEMS 124	PRINTED CIRCUIT BOARD TEST & TROUBLESHOOTING [3]	3
SDEV 101	INTRODUCTION TO THE LCCC COMMUNITY [2]	1
	Hours	**17**
Spring Semester		
CADD 111	INTRODUCTION TO COMPUTER AIDED DRAFTING [3]	2
CADD 216	INTRODUCTION TO 3D MODELING AND PRINTING	1
DFAB 111	INTRODUCTION TO PERSONAL FABRICATION	1
ENGL 161	COLLEGE COMPOSITION I [1]	3
MEMS 132 or MEMS 133	MEMS PACKAGING [3, 8] or INTRODUCTION TO CIRCUIT BOARD DESIGN	3
MEMS 134	THRU-HOLE MANUFACTURING [3]	2
MEMS 136 or ELCT 121	INTRODUCTION TO SEMICONDUCTORS AND CLEANROOM PROCESSING [3, 8] or DIGITAL ELECTRONICS	4
	Hours	**16**
Second Year		
Fall Semester		
CHMY 171	GENERAL CHEMISTRY I [1]	5
ELCT 233	ELECTRONIC DEVICES I [3]	4
MEMS 211	SEMICONDUCTOR PROCESSING [3]	3
MEMS 287	WORK-BASED LEARNING I - MEMS [4]	1
MTHM 168	STATISTICS [1,3]	3
	Hours	**16**
Spring Semester		
ENGL 164 or ENGL 162	COLLEGE COMPOSITION II WITH TECHNICAL TOPICS [1,3] or COLLEGE COMPOSITION II	3
MEMS 221	MICRO-SYSTEM CAPSTONE PROJECT [3]	3
MEMS 288	WORK-BASED LEARNING II - MEMS [3,4]	1
Arts and Humanities Elective [6]		3
Social Sciences Elective [7]		3
	Hours	**13**
Third Year		
Fall Semester		
CADD 313 or TECN 422	INTRODUCTION TO SOLIDWORKS WITH ADVANCED PROJECTS [3] or TECHNICAL PROJECT MANAGEMENT	3-4
ELCT 112	ELECTRICAL CIRCUITS II [3]	4
MEMS 311	PCB AND FLEX DESIGN [3]	3
PHYC 150	GENERAL PHYSICS I [1,3]	4
TECN 115	INDUSTRIAL BLUEPRINT READING	2
	Hours	**16-17**
Spring Semester		
ELCT 234	ELECTRONIC DEVICES II [3]	4
MEMS 322	SMT MANUFACTURING [3]	3
MEMS 323	SMT PROGRAMMING [3]	3
MEMS 387	WORK-BASED LEARNING - MEMS [3,4]	1
QLTY 122	BASIC QUALITY TOOLS AND APPLICATIONS [3]	3
TECN 345	GEOMETRIC DIMENSIONING AND TOLERANCING WITH ADVANCED PROJECTS [3]	2
	Hours	**16**
Fourth Year		
Fall Semester		
HSTR 260G	HISTORY OF AMERICAN TECHNOLOGY [7]	3
HSTR 271	AMERICAN CIVIC LITERACY [9]	3
MEMS 351 or ELCT 221	MICROCONTROLLER HARDWARE DESIGN & PROGRAMMING [3] or MICROCONTROLLERS	4
MEMS 412	AOI PROGRAMMING [3]	3
MEMS 413	BGA REWORK & X-RAY INSPECTION [3]	2
MEMS 487	WORK BASED LEARNING MEMS [3,4]	1
	Hours	**16**

Spring Semester		
MEMS 421	SENIOR PROJECT - NEW PRODUCT INTRODUCTION [3]	3
QLTY 241	ISO 9001 [3]	2
QLTY 334	LEAN SIX SIGMA FOR PROCESS IMPROVEMENT WITH ADVANCED PROJECTS [3]	4
MEMS 415	PRINCIPLES OF LABVIEW [3]	4
Arts and Humanities Electives [6]		3
	Hours	**16**
	Total Hours	**126-127**

[1] Indicates that this course requires placement for entrance.

[2] *Required when registering for more than six credit hours or any accumulation of 12 or more credits.* ***Exceptions*** *to this requirement include: transfer students with GPA of 2.0 or higher, CCP students with 12 or more credit hours and a GPA of 2.0 or higher; transient students; students registering for audit only; students who have completed an associate degree or higher from an accredited institution recognized by LCCC.*

[3] Indicates that this course has a prerequisite and/or may be taken concurrently with other courses.

[4] Student must be first employed within their field of study before taking this class - this course offers an opportunity for experiential learning in a job or internship related to the field of study of MEMS.

[5] Indicates that this course is at a 300 level at other universities.

[6] This program requires Arts and Humanities OT 36 electives (http://catalog.lorainccc.edu/academic-information/transfer-module-requirements/). These courses must be chosen from two different disciplines from each other.

[7] This program requires Social Science OT 36 electives (http://catalog.lorainccc.edu/academic-information/transfer-module-requirements/), specifically including HSTR 260G and HSTR 271. If the student has taken HSTR 260G or HSTR 271 during the associates degree, they must take another Social Science elective as part of their bachelors degree.

[8] Take MEMS 132 or MEMS 136 if student is more interested in manufacturing for semiconductors or in a cleanroom with a more immediate career pathway. Take MEMS 133 or ELCT 121 if student is more interested in design and a 2nd year career pathway.

[9] This course is mandated by Ohio Senate Bill 1 signed in March 2025, no other course substitutions can be made for this class.

Program Contact(s):

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For information about admissions, enrollment, transfer, graduation and other general questions, please contact your advising team (https://www.lorainccc.edu/admissions-and-enrollment/advising-and-counseling/).

Program Requirements

This program requires a complete application form on file by May 20 (fall cohort)

1. Eligible to apply/earn AAS MEMS
2. Cumulative GPA of 2.0 (for transfer students, it has to be combined cumulative GPA of 2.0)

More program information can be found on our website. (https://www.lorainccc.edu/engineering/mechatronics/associate-of-applied-science-in-mechatronics-technology-micro-electromechanical-systems-mems/)

Credit for Prior Learning (PLA) options may be available for your program. For more information, please visit our website: www.lorainccc.edu/PLA (http://www.lorainccc.edu/PLA)

Program Learning Outcomes

1. Apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline of microelectronic manufacturing (MEMS).

2. Design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline of microelectronic manufacturing.

3. Apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.

4. Conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.

5. Function effectively as a member as well as a leader on technical teams.

Objectives

An accreditable program will prepare graduates with technical and managerial skills necessary for entry into industry of the design, manufacturing, process optimization, inspecting, testing, and troubleshooting of PCB and related microelectronic products. Graduates of the associate degree programs are expected to have strengths in the knowledge of equipment operations, assembly, testing, and troubleshooting of prototyping a PCB and associated microelectronic components, while baccalaureate degree graduates are expected to be prepared for careers in design, engineering process optimization, and management within the field of microelectronic manufacturing including the operation, programming, and troubleshooting of high-volume PCB manufacturing equipment, inspection, troubleshooting, repair, and technical reporting on manufactured PCB as well as quality, drafting, continuous improvement, lean manufacturing, and six sigma.

Program Educational Objectives

1. Achieve technical expertise in the manufacturing, assembly, and testing of microelectronic hardware by programming and operating equipment used in the field of high-volume microelectronic manufacturing.
2. Apply modern manufacturing methods using industry certified processes and systematic quality tools to contribute to an organization's quality, efficiency, and cost reduction.
3. Successfully implement improvements by applying product-applicable optimization techniques using product design, automated

manufacturing, and Process risk analysis using Failure Mode and Effect Analysis (PFMEA).

4. Apply skills in microelectronic product development, manufacturing technology, and management of a technical team developed from a collegiate internship to achieve career growth through lifelong learning, leadership, and ethical contributions.