Engineering Technology (AAS)

Catalog Effective Term: Fall 2025
Program Code: APETCH
Credential: Associate in Applied Science
High Demand Occupation, High Skill Occupation, High Wage Occupation

This program is designed to provide students with the opportunity to develop hands-on skills for careers in high-demand fields like semiconductor and battery manufacturing, industrial electronics, and robotics technology. As the demand for skilled semiconductor and nanotechnology professionals continues to rise in our increasingly connected world, this program aims to strengthen the local workforce, equipping it with the expertise needed to compete on a global scale in this critical industry.

In the Industrial Electronics Concentration, students will develop skills in mechatronics and industrial automation, and will earn the additional Industrial Electronics Technology certificate upon completing the program. In the Semiconductor and Battery Manufacturing Concentration, students will develop skills in robotics and electronics manufacturing, and will earn the additional Semiconductor and Battery Manufacturing and Robotics Technician certificates upon completing the program.

Select one of the following concentrations:

- Industrial Electronics (INEL)
- Semiconductor and Battery Manufacturing (SBM)

Full-Time Students

Industrial Electronics (INEL)

Minimum Credits Required for the Concentration: 60

First Semester		Credits
ELE 111	Electrical Fundamentals	4
MEC 101	Blueprint Reading for Manufacturing	2
MTH 176	College Algebra	4
or higher numbered 4cr math course		
NCT 120	Introduction to 2D CAD CAM Programming and Applications	2
	Credits	**12**
Second Semester		
CEM 101	Introductory Chemistry	4
or higher numbered 4cr chemistry course		
CNT 206	Introduction to Networks	4
ELE 211	Basic Electronics	4
Speech/Comp. Elective(s)		3
	Credits	**15**
Third Semester		
ELE 134	Motors and Controls	4
ENG 111	Composition I	4

	Credits	**8**
Fourth Semester		
ELE 121	Hand Soldering Techniques	2
ELE 224	Programmable Controllers (PLCs) I	4
CST 140	Digital Logic and Computer Design	3
Soc. Sci. Elective(s)		3
	Credits	**12**
Fifth Semester		
ELE 254	Programmable Controllers (PLCs) II	4
MEC 105	Pneumatics and Hydraulics in Fluid Power	4
MEC 201	Mechanisms and Introduction to Mechatronics	2
Arts/Human. Elective(s)		3
	Credits	**13**
	Total Credits	**60**

Semiconductor and Battery Manufacturing (SBM)

Minimum Credits Required for the Concentration or Option: 60

First Semester		**Credits**
ELE 111	Electrical Fundamentals	4
MEC 101	Blueprint Reading for Manufacturing	2
MTH 176	College Algebra	4

or higher numbered 4cr math course		
ROB 101	Robotics I - I	2
ROB 110	Robotics I - II	2
	Credits	**14**
Second Semester		
CEM 101	Introductory Chemistry	4
or higher numbered 4cr chemistry course		
ENG 111	Composition I	4
ELE 211	Basic Electronics	4
ROB 212	Robotics II	4
	Credits	**16**
Third Semester		
ELE 121	Hand Soldering Techniques	2
ELE 224	Programmable Controllers (PLCs) I	4
MEC 105	Pneumatics and Hydraulics in Fluid Power	4
Soc. Sci. Elective(s)		3
Restricted Elective(s)		2-3
CST 140	Digital Logic and Computer Design	
MEC 100	Materials and Processes	
MEC 201	Mechanisms and Introduction to Mechatronics	

NCT 120	Introduction to 2D CAD CAM Programming and Applications	
	Credits	**15**
Fourth Semester		
ELE 206	Semiconductor Manufacturing	2
ELE 208	Battery Manufacturing	2
ELE 254	Programmable Controllers (PLCs) II	4
Arts/Human. Elective(s)		3
Speech/Comp. Elective(s)		3
Open Elective(s) to reach a minimum of 60 total credits.		1
	Credits	**15**
	Total Credits	**60**

Part-Time Students

Industrial Electronics (INEL)

Minimum Credits Required for the Concentration or Option: 60

First Semester		**Credits**
ELE 111	Electrical Fundamentals	4
MTH 176	College Algebra	4

or higher numbered 4cr math course		
	Credits	**8**
Second Semester		
ELE 211	Basic Electronics	4
MEC 101	Blueprint Reading for Manufacturing	2
NCT 120	Introduction to 2D CAD CAM Programming and Applications	2
	Credits	**8**
Third Semester		
CEM 101	Introductory Chemistry	4
or higher numbered 4cr chemistry course		
ENG 111	Composition I	4
	Credits	**8**
Fourth Semester		
CST 140	Digital Logic and Computer Design	3
ELE 121	Hand Soldering Techniques	2
ELE 224	Programmable Controllers (PLCs) I	4
	Credits	**9**
Fifth Semester		
ELE 254	Programmable Controllers (PLCs) II	4
MEC 201	Mechanisms and Introduction to Mechatronics	2

	Credits	**6**
Sixth Semester		
ELE 134	Motors and Controls	4
Arts/Human. Elective(s)		3
	Credits	**7**
Seventh Semester		
Soc. Sci. Elective(s)		3
MEC 105	Pneumatics and Hydraulics in Fluid Power	4
	Credits	**7**
Eighth Semester		
CNT 206	Introduction to Networks	4
Speech/Comp. Elective(s)		3
	Credits	**7**
	Total Credits	**60**

Semiconductor and Battery Manufacturing (SBM)

Minimum Credits Required for the Concentration or Option: 60

First Semester		**Credits**
ELE 111	Electrical Fundamentals	4
MTH 176	College Algebra	4
or higher numbered 4cr math course		

	Credits	**8**
Second Semester		
ROB 101	Robotics I - I	2
ROB 110	Robotics I - II	2
MEC 101	Blueprint Reading for Manufacturing	2
	Credits	**6**
Third Semester		
ROB 212	Robotics II	4
ENG 111	Composition I	4
	Credits	**8**
Fourth Semester		
CEM 101	Introductory Chemistry	4
or higher numbered 4cr chemistry course		
ELE 224	Programmable Controllers (PLCs) I	4
	Credits	**8**
Fifth Semester		
ELE 254	Programmable Controllers (PLCs) II	4
Speech/Comp. Elective(s)		3
	Credits	**7**
Sixth Semester		
Arts/Human. Elective(s)		3

Soc. Sci. Elective(s)		3
ELE 121	Hand Soldering Techniques	2
	Credits	**8**
Seventh Semester		
ELE 206	Semiconductor Manufacturing	2
ELE 211	Basic Electronics	4
Restricted Elective(s)		2-3
CST 140	Digital Logic and Computer Design	
MEC 100	Materials and Processes	
MEC 201	Mechanisms and Introduction to Mechatronics	
NCT 120	Introduction to 2D CAD CAM Programming and Applications	
	Credits	**8**
Eighth Semester		
ELE 208	Battery Manufacturing	2
MEC 105	Pneumatics and Hydraulics in Fluid Power	4
Open Elective(s) to reach a minimum of 60 total credits.		1
	Credits	**7**
	Total Credits	**60**

Washtenaw Community College

PROGRAM PROPOSAL FORM

☐ **Preliminary Approval** – Check here when using this form for preliminary approval of a program proposal, and respond to the items in general terms.

☐ **Final Approval** – Check here when completing this form after the Vice President for Instruction has given preliminary approval to a program proposal. For final approval, complete information must be provided for each item.

Program Name: **Division and Department:** **Type of Award:** **Effective Year (new programs are always effective in the Fall term):** **Initiator:**	Engineering Technology Concentration in Semiconductor and Battery Manufacturing Concentration in Industrial Electronics Technology Advanced Manufacturing ☐ AA ☐ AS ☒ **AAS** ☐ Cert. ☐ Adv. Cert. ☐ Post-Assoc. Cert. ☐ Cert. of Comp. Fall 2025 Zach Goldenberg	**Program Code:** _____ **CIP Code:** 15.0000
Program Features Program's purpose and its goals. Criteria for entry into the program, along with projected enrollment figures. Connection to other WCC programs, as well as accrediting agencies or professional organizations. Special features of the program.	**Program Purpose and Goals** The Engineering Technology program at WCC is designed to provide students with the technical expertise and hands-on skills needed for immediate employment in high-demand fields, such as semiconductor and battery manufacturing, and industrial electronics. With a curriculum that emphasizes applied engineering principles and real-world problem-solving, students gain the capabilities to design, innovate, and refine products and processes in alignment with current industry standards and technological advancements. **Program Connections and Accreditation** WCC's Engineering Technology program integrates seamlessly with other complementary areas of study, including: • **Advanced Manufacturing**: Through coursework in mechatronics, robotics, CNC machining, and more, this department equips students with comprehensive knowledge of key manufacturing processes. • **Bachelor's Degree Pathways**: The program offers transfer options for students who wish to pursue bachelor's degrees in related fields at one of WCC's partner institutions, ensuring a smooth transition to further education. **Special Features** The Engineering Technology program at WCC stands out with several distinctive features: • **State-of-the-Art Facilities**: Access to advanced laboratories equipped with industry-standard tools and technology allows students to engage in immersive, hands-on learning. • **Experienced Faculty**: With extensive industry experience, faculty members provide mentorship and insights that bridge classroom learning with real-world practices.	

	• **Industry Partnerships**: Collaborations with local and national businesses offer students valuable opportunities for internships, cooperative learning experiences, and potential employment. • **Flexible Scheduling**: Day and evening classes support both full-time and part-time students, making the program accessible to a wide range of learners. The program also includes embedded certificate options within the concentration they choose, enabling students to build momentum in their educational journey while earning additional credentials: • **Industrial Electronics Technology Certificate (CFIET)** • **Robotics Technician Certificate (CTROBT)** • **Semiconductor and Battery Manufacturing Advanced Certificate (new certificate proposed in tandem with this program, currently seeking approval)** Collectively, these program elements prepare graduates to excel and make meaningful contributions in their chosen fields, ensuring they are workforce-ready and adaptable to evolving industry demands.
Need Need for the program with evidence to support the stated need.	The Engineering Technology program at WCC meets a critical need for skilled technicians in high-growth industries such as semiconductor and battery manufacturing, and industrial electronics. With rising demand for expertise in electric vehicles, renewable energy, and advanced electronics, this program equips students with practical skills that are essential in local and national markets, offering competitive wages and stable career paths. Southeast Michigan is considered a "hotspot" for careers in this field. Technician positions in semiconductor processing, electronic or nanotechnology engineering have been on the rise, and the rise is expected to continue. Electro-mechanical, commercial electronics repair, control & valve installers and robotics technician careers are also plentiful, especially in Wayne and Oakland counties. Entry-level positions in these fields average between $60 and $70k annually. Through hands-on learning and specialized certificates, graduates will be prepared to support innovation and sustainability, and become better qualified to fill these essential roles in industries vital to future technology and economic development.
Curriculum List the courses in the program as they should appear in the catalog. List minimum credits required. Include any notes that should appear below the course list. Associate degree programs must provide a semester by semester program layout.	**See attached Excel Spreadsheet**

Budget Specify program costs in the following areas, per academic year:		START-UP COSTS	ONGOING COSTS
	Faculty	$.	$.
	Training/Travel	.	.
	Materials/Resources	.	.
	Facilities/Equipment	.	.
	Other	.	.
	TOTALS:	$.	$.
Program Description for Catalog and Web site	This program is designed to provide students with the opportunity to develop hands-on skills for careers in high-demand fields like semiconductor and battery manufacturing, industrial electronics, and robotics technology. As the demand for skilled semiconductor and nanotechnology professionals continues to rise in our increasingly connected world, this program aims to strengthen the local workforce, equipping it with the expertise needed to compete on a global scale in this critical industry. In the Industrial Electronics Concentration, students will develop skills in mechatronics and industrial automation, and will earn the additional Industrial Electronics Technology certificate upon completing the program. In the Semiconductor and Battery Manufacturing Concentration, students will develop skills in robotics and electronics manufacturing, and will earn the additional Semiconductor & Battery Manufacturing and Robotics Technician certificates upon completing the program.		
Program Information	**Accreditation/Licensure – None** **Advisors – Niki Lee & Jan Militello** **Advisory Committee – N/A** **Admission requirements – N/A** **Articulation agreements – Exploring transfer opportunities with Wayne State, EMU and U of M** **Continuing eligibility requirements – N/A**		

Assessment plan for Semiconductor and Battery Manufacturing Concentration

Program outcomes to be assessed	Assessment tool	When assessment will take place	Courses/other populations	Number students to be assessed
1. Identify the major concepts of the semi-conductor manufacturing industry.	Outcome-related exam questions	Fall 2027 Every Three Years	ELE 206	All
2. Explain how batteries function, including electrochemistry, materials, and design considerations.	Outcome-related exam questions	Fall 2027 Every Three Years	ELE 208	All

3. Install and troubleshoot PLC analog I/O (Programmable Logic Controller analog input/output).	Outcome-related exam questions and lab quizzes	Fall 2027 Every Three Years	ELE 254	All

Assessment plan for Industrial Electronics Technology Concentration

Program outcomes to be assessed	Assessment tool	When assessment will take place	Courses/other populations	Number students to be assessed
1. Create acceptable through-hole and surface mount solder joints.	Outcome-related demonstration	Fall 2027 Every Three Years	ELE 121	All
2. Develop, interpret and troubleshoot programmable logic controller (PLC) programs with relay-type, timer, counter, data manipulation, math and program control instructions using PLC programming and monitoring software.	Outcome-related exam questions	Fall 2027 Every Three Years	ELE 224	All
3. Experiment with diodes to observe response to changes in temperature and current flow conditions and analyze the diode voltage drops change for semiconductors placed in circuits.	Outcome-related lab project	Fall 2027 Every Three Years	ELE 211	All

Scoring and analysis plan:

1. Indicate how the above assessment(s) will be scored and evaluated (e.g. departmentally-developed rubric, external evaluation, other). Attach the rubric.

   Outcome-related demonstration: checklist
   Outcome-related exam questions: answer key
   Outcome-related lab project/lab quizzes: rubric

2. Indicate the standard of success to be used for this assessment.

   70% of students will score 70% or higher.

3. Indicate who will score and analyze the data.

Departmental faculty will score and analyze the data.

REVIEWER	PRINT NAME	SIGNATURE	DATE
Initiator	Zach Goldenberg	Zach Goldenberg	11/19/2024
Department Chair/Area Director	Al Coleman	Al Coleman	11/19/2024
Dean	Eva Samulski	Eva Samulski	11/20/2024
Please return completed form to the Office of Curriculum and Assessment (SC 257) or by email to curriculum.assessment@wccnet.edu. Once reviewed by the appropriate faculty committees, we will secure the signature of the VPI and President.			
Curriculum Committee Chair	Randy Van Wagnen		1-11-25
Assessment Committee Chair	Jessica Hale		2/13/25
Executive Vice President for Instruction ☐ Approved for Development ☑ Final Approval	Dr. Brandon Tucker		2/25/25
President	Dr. Rose B. Bellanca		3/4/25
Board Approval			4/22/2025

Reviewed by C&A Committee 1/30/25

Semiconductor and Battery Manufacturing Engineering Technology	
Semester 1 Fall	
ELE 111	4
MTH 176 or higher 4 credit math course	4
ROB 101	2
ROB 110	2
MEC 101	2
Semester 2 Winter	
ENG 111	4
ROB 212	4
ELE 211	4
CEM 101 or higher 4 credit chemistry course	4
Semester 3 Fall	
Soc. Sci Elect	3
ELE 224	4
ELE 121	2
Restricted Elective (MEC 100, MEC 201, NCT 120, CST 140)	2
MEC 105	4
Semester 4 Winter	
ELE 254	4
ELE 206	2
ELE 208	2
Art/Hum Elect	3
Speech/Comp Elect	3
Open Elective(s) to reach a minimum of 60 total credits.	1
Total	**60**

Industrial Electronics Engineering Technology	
Semester 1 Fall	
ELE 111	4
MTH 176 or higher 4 credit math course	4
NCT 120	2
MEC 101	2
Semester 2 Winter	
ELE 211	4
CEM 101 or higher 4 credit Chemistry course or PHY 111	4
CNT 206	4
Speech/Comp Elect	3
Semester 3 Summer	
ELE 134	4
ENG 111	4
Semester 4 Fall	
ELE 224	4
ELE 121	2
CST 140	3
Soc. Sci Elect	3
Semester 5 Winter	
ELE 254	4
MEC 201	2
MEC 105	4
Art/Hum Elect	3
Total	**60**

Semiconductor and Battery Manufacturing Engineering Technology	
Semester 1 Fall	
ELE 111	4
MTH 176 or higher 4 credit math course	4
Semester 2 Winter	
ROB 101	2
ROB 110	2
MEC 101	2
Semester 3 Summer	
ROB 212	4
ENG 111	4
Semester 4 Fall	
ELE 224	4
CEM 101 or higher 4 credit chemistry course	4
Semester 5 Winter	
ELE 254	4
Speech/Comp Elect	3
Semester 6 Summer	
Soc. Sci Elect	3
Art/Hum Elect	3
Semester 7 Fall	
ELE 211	4
ELE 121	2
Restricted Elective (MEC 100, MEC 201, NCT 120, CST 140)	2
Semester 8 Winter	
ELE 206	2
ELE 208	2
MEC 105	4
Open Elective(s) to reach a minimum of 60 total credits.	1
Total	**60**

Industrial Electronics Engineering Technology	
Semester 1 Fall	
ELE 111	4
MTH 176 or higher 4 credit math course	4
Semester 2 Winter	
ELE 211	4
NCT 120	2
MEC 101	2
Semester 3 Summer	
CEM 101 or higher 4 credit Chemistry course or PHY 111	4
ENG 111	4
Semester 4 Fall	
ELE 224	4
ELE 121	2
CST 140	3
Semester 5 Winter	
ELE 254	4
MEC 201	2
Semester 6 Summer	
ELE 134	4
Art/Hum Elect	3
Semester 7 Fall	
Soc. Sci Elect	3
MEC 105	4
Semester 8 Winter	
CNT 206	4
Speech/Comp Elect	3
Total	**60**