

Semiconductor and Battery Manufacturing (Advanced Certificate)

Catalog Effective Term: Fall 2025

Program Code: CVSBMF

Credential: Advanced Certificate

This program is designed to prepare students for high-demand careers in the semiconductor and battery industries. This program will provide hands-on training in semiconductor fabrication, battery assembly, testing, and quality control, with a focus on emerging technologies in electric vehicles (EV) and renewable energy storage. Students will develop the technical skills required for roles in advanced manufacturing, including process and test technicians. With connections to local industry partners and the opportunity to earn industry-recognized certifications, graduates will be equipped to enter a rapidly growing field with strong career prospects.

Students should have completed the [Robotics Technician \(CTROBT\) Certificate](#) or have completed the courses within that certificate prior to enrolling in this advanced certificate.

Minimum Credits Required for the Program: 18

Major/Area Requirements		
ELE 121	Hand Soldering Techniques	2
ELE 206	Semiconductor Manufacturing	2
ELE 208	Battery Manufacturing	2

<u>ELE 211</u>	Basic Electronics	4
<u>ELE 254</u>	Programmable Controllers (PLCs) II	4
<u>MEC 105</u>	Pneumatics and Hydraulics in Fluid Power	4
Total Credits		18

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:	<u>Semiconductor & Battery Manufacturing</u> <u>ATP/Advanced Manufacturing</u> ☐ AA ☐ AS ☐ AAS ☐ Cert. ☒ Adv. Cert. ☐ Post-Assoc. Cert. ☐ Cert. of Comp. <u>Fall 2025</u> <u>Zachary Goldenberg</u>	Program Code: <u>CVSBMF</u> CIP Code: <u>15.0616</u>
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 Semiconductor & Battery Advanced Certificate Program at Washtenaw Community College is designed to equip students with the specialized skills required for careers in advanced manufacturing, focusing on semiconductor fabrication and battery technology. The program aims to: • Prepare students for high-demand roles in the semiconductor and battery manufacturing sectors. • Provide hands-on experience in semiconductor and battery manufacturing and maintenance practices. • Offer a blend of theoretical knowledge and practical skills in emerging technologies like electric vehicles (EV) and renewable energy storage systems. • Help students develop critical thinking and problem-solving abilities specific to manufacturing processes, quality control, and equipment operation, troubleshooting, and repair. Criteria for Entry: Entry Requirements: This is an advanced certificate. Students should have completed the Robotics Technician Certificate (CTROBT) prior to enrolling in this certificate. Projected Enrollment: It is anticipated that the program will attract around 20-30 students per academic year, with a potential for growth due to increased industry demand. Connections to Other WCC Programs and Professional Organizations: The program aligns with existing programs in Advanced Manufacturing at WCC. Partnerships with local industry leaders, such as those in automotive manufacturing and battery technology, will provide opportunities for internships, apprenticeships, and potential job placements. Special Features of the Program:	

	State-of-the-Art Facilities: Students will have access to cutting-edge labs equipped with semiconductor fabrication tools, battery testing stations, and automation technology. Industry Collaboration: Strong partnerships with regional manufacturers in the semiconductor and battery industries will offer guest lectures, field trips, and hands-on projects directly tied to real-world applications. Career Pathways: The program is designed to provide clear career pathways into roles such as process technician, test technician, and manufacturing engineer, with a particular focus on the growing electric vehicle (EV) and energy storage markets. This comprehensive certificate program is tailored to meet the growing demands of the advanced manufacturing industry, preparing students for successful careers in the ever-expanding semiconductor and battery sectors.
Need Need for the program with evidence to support the stated need.	The Advanced Manufacturing - Semiconductor & Battery Advanced Certificate Program is driven by the significant demand for skilled professionals in the semiconductor and battery industries, both nationally and locally. As the global economy continues to transition towards clean energy technologies, including electric vehicles (EVs) and renewable energy storage systems, the need for trained technicians with expertise in semiconductor fabrication and battery assembly has surged. 1. Growing Industry Demand: The semiconductor and battery sectors are critical to various high-tech industries, including consumer electronics, electric vehicles, renewable energy systems, and defense. The global shortage of semiconductors in recent years has highlighted the need for increased domestic production capabilities, leading to heightened investment in semiconductor manufacturing. According to the Semiconductor Industry Association (SIA), U.S. semiconductor manufacturing is expected to see significant growth due to the Creating Helpful Incentives to Produce Semiconductors for America (CHIPS) Act, which provides federal funding to boost domestic chip production. At the same time, the growth of the EV market has accelerated the demand for advanced battery technologies. Bloomberg New Energy Finance projects that global electric vehicle sales will increase to 54 million by 2040, making batteries a central component of this market. The combination of these two trends creates a strong and growing demand for professionals skilled in the manufacturing processes that support both semiconductors and batteries. 2. Workforce Gaps and Shortages: The demand for skilled workers in semiconductor and battery manufacturing far exceeds the current supply. In Michigan alone, there is a recognized shortage of workers who possess the technical expertise required to work in these advanced manufacturing sectors. According to the Michigan Economic Development Corporation (MEDC), the state has made substantial investments in EV and semiconductor manufacturing but continues to face challenges in finding qualified workers to fill key positions in production, maintenance, and engineering. This certificate program addresses these gaps by equipping students with the necessary skills to meet the hiring needs of these industries. 3. Regional Economic Development: Southeast Michigan, home to major automotive manufacturers and technology companies, is rapidly becoming a hub for advanced manufacturing, including semiconductors and batteries. Local employers like General Motors, Ford, and

	Stellantis, along with several battery manufacturers and semiconductor fabricators, have been expanding operations in the region. These companies are actively seeking a workforce trained in advanced manufacturing technologies. Washtenaw Community College, located in the heart of this region, is ideally positioned to provide the necessary educational infrastructure to support this local workforce demand. 4. Sustainability and Clean Energy Initiatives: With the global push towards sustainability and the reduction of carbon emissions, semiconductors and batteries are key components in developing technologies that enable cleaner energy solutions. Batteries are essential for energy storage in renewable energy systems, while semiconductors drive the digitalization of clean energy solutions. As Michigan and the broader U.S. work to meet ambitious climate goals, such as achieving net-zero emissions by 2050, there is a pressing need for skilled workers who can innovate and advance these technologies. 5. Job Opportunities and Competitive Salaries: The U.S. Bureau of Labor Statistics (BLS) projects that jobs in semiconductor and battery-related fields, such as electrical engineering technicians, manufacturing technologists, and production technicians, will see above-average growth in the coming years. Median annual wages for semiconductor process technicians are around \$60,000, while skilled battery manufacturing technicians can expect salaries in a similar range, with the potential for higher earnings as demand grows. The Advanced Manufacturing - Semiconductor & Battery Certificate Program is crucial in meeting the workforce needs of a rapidly growing industry. With the convergence of global demand for semiconductors, the rise of electric vehicles, and the push for sustainable energy solutions, the program addresses both immediate and long-term labor market demands. This program will position WCC as a leader in advanced manufacturing education, providing students with high-paying job opportunities and supporting economic growth in the region.																																										
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.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4">Semiconductor and Battery Manufacturing Advanced Certificate Curriculum</th> </tr> <tr> <td colspan="4">The Robotics Technician Certificate is a pre-requisite for this advanced certificate</td> </tr> <tr> <th>Course No.</th> <th>Course Title</th> <th>Credit Hrs</th> <th>Contact Hrs</th> </tr> <tr> <td>ELE 211</td> <td>Basic Electronics</td> <td>4</td> <td>90</td> </tr> <tr> <td>ELE 254</td> <td>Programmable Controllers (PLCs) II</td> <td>4</td> <td>90</td> </tr> <tr> <td>MEC 105</td> <td>Pneumatics and Hydraulics in Fluid Power</td> <td>4</td> <td>90</td> </tr> <tr> <td>ELE 121</td> <td>Hand Soldering Techniques</td> <td>2</td> <td>45</td> </tr> <tr> <td>ELE 206</td> <td>Semiconductor Manufacturing</td> <td>2</td> <td>45</td> </tr> <tr> <td>ELE 208</td> <td>Battery Manufacturing</td> <td>2</td> <td>45</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>18</td> <td>405</td> </tr> </table>			Semiconductor and Battery Manufacturing Advanced Certificate Curriculum				The Robotics Technician Certificate is a pre-requisite for this advanced certificate				Course No.	Course Title	Credit Hrs	Contact Hrs	ELE 211	Basic Electronics	4	90	ELE 254	Programmable Controllers (PLCs) II	4	90	MEC 105	Pneumatics and Hydraulics in Fluid Power	4	90	ELE 121	Hand Soldering Techniques	2	45	ELE 206	Semiconductor Manufacturing	2	45	ELE 208	Battery Manufacturing	2	45	Total		18	405
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Budget Specify program costs in the following areas, per academic year: <i>★ This program + associated costs are funded by MEDC Semiconductor Grant - BRT</i>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th></th> <th>START-UP COSTS</th> <th>ONGOING COSTS</th> </tr> <tr> <td>Faculty</td> <td style="text-align: right;">\$ 0.00</td> <td style="text-align: right;">\$ 0.00</td> </tr> <tr> <td>Training/Travel</td> <td style="text-align: right;">0.00</td> <td style="text-align: right;">0.00</td> </tr> <tr> <td>Materials/Resources</td> <td style="text-align: right;">0.00</td> <td style="text-align: right;">0.00</td> </tr> <tr> <td>Facilities/Equipment</td> <td style="text-align: right;">0.00</td> <td style="text-align: right;">0.00</td> </tr> <tr> <td>Other</td> <td style="text-align: right;">0.00</td> <td style="text-align: right;">0.00</td> </tr> <tr> <td style="text-align: right;">TOTALS:</td> <td style="text-align: right;">\$ 0.00</td> <td style="text-align: right;">\$ 0.00</td> </tr> </table>				START-UP COSTS	ONGOING COSTS	Faculty	\$ 0.00	\$ 0.00	Training/Travel	0.00	0.00	Materials/Resources	0.00	0.00	Facilities/Equipment	0.00	0.00	Other	0.00	0.00	TOTALS:	\$ 0.00	\$ 0.00																			
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Program Description for Catalog and Web site	This program is designed to prepare students for high-demand careers in the semiconductor and battery industries. This program will provide hands-on training in semiconductor fabrication, battery assembly, testing, and quality control, with a focus on emerging technologies in electric vehicles (EV) and renewable energy storage. Students will develop the technical skills required for roles in advanced manufacturing, including process and test technicians. With connections to local industry partners and the opportunity to earn industry-recognized certifications, graduates will be equipped to enter a rapidly growing field with strong career prospects.
Program Information	Accreditation/Licensure – None Advisors – Niki Lee & Jan Militello Advisory Committee – N/A Admission requirements – Students should have the Robotics Technician courses/program completed prior to enrolling in this advanced certificate. Articulation agreements – Certificate will be nested within a proposed Engineering Tech degree; we are exploring transfer opportunities with Wayne State, EMU and UofM Continuing eligibility requirements – N/A

Assessment plan:

Program outcomes to be assessed	Assessment tool	When assessment will take place	Courses/other populations	Number students to be assessed
1. Describe the battery manufacturing process.	Outcome-related exam questions	Fall 2027 Every Three Years	ELE 208	All
2. Demonstrate proper procedures for working in a clean room manufacturing environment.	Outcome-related demonstration	Fall 2027 Every Three Years	ELE 206	All
3. Identify the properties of transistors and operational amplifiers, and analyze their behavior in circuits. (ELE 211 SLOs 2 & 3)	Outcome-related exam questions	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 exam questions: answer key and rubric

Outcome-related demonstration: checklist

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	10/28/2024
Department Chair/Area Director	Allan Coleman	Al Coleman	10/30/2024
Dean	Eva Samulski	<i>Eva Samulski</i>	<i>November 4, 2024</i>
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	<i>R Van Wagnen</i>	<i>1-11-25</i>
Assessment Committee Chair	Jessica Hale	<i>J Hale</i>	2/13/25
Executive Vice President for Instruction ☐ Approved for Development ☒ Final Approval	Dr. Brandon Tucker	<i>Brandon Tucker</i>	<i>2/25/25</i>
President	Dr. Rose B. Bellanca	<i>RB Bellanca</i>	<i>3/6/25</i>
Board Approval			4/22/25

Reviewed by C&A Committee 1/30/25

