



# ADVANCED MANUFACTURING TECHNOLOGY

## Associate in Applied Science (AAS) Program Code: 10-664-2 Total Credits: 62

The Advanced Manufacturing Technology program combines foundational coursework in the areas of electromechanical and automation systems with advanced coursework in Industry 4.0 concepts and quality manufacturing. Students gain hands-on experience with tools and equipment used in the field.

In this program you'll learn to operate and program robotics, troubleshoot computer networks, and interface digital logic circuits. You'll set up, make, and maintain automated systems, such as machines interacting with machines and machines making decisions (AI). You'll also use sensors within the system to map, explore, and execute a variety of tasks, such as deliver, pick up, and sort.

**Estimated tuition and fees:** [mstc.edu/programcosts](https://mstc.edu/programcosts)

### ACADEMIC ADVISOR

To schedule an appointment with an academic advisor, call 715.422.5300. Academic advisors will travel to other campuses as necessary to accommodate student needs. For more information about advising, visit [mstc.edu/advising](https://mstc.edu/advising).

### NEW STUDENT CHECKLIST

Complete the following steps to prepare for your New Student Advising appointment with your academic advisor:

- ☐ Submit a Mid-State application at [mstc.edu/apply](https://mstc.edu/apply).
- ☐ Send official transcripts to:  
Mid-State Technical College  
Student Services  
1001 Centerpoint Drive  
Stevens Point, WI 54481
- ☐ Complete the Free Application for Federal Student Aid (FAFSA) at [fafsa.gov](https://fafsa.gov). Mid-State's Financial Aid team is available to assist with your FAFSA application and to answer your financial aid questions. Contact Financial Aid or schedule an appointment at [mstc.edu/financial-aid](https://mstc.edu/financial-aid).
- ☐ Set up student MyCampus account at [mstc.edu/mycampus-assistance](https://mstc.edu/mycampus-assistance).
- ☐ Schedule a New Student Advising appointment at [mstc.edu/advising](https://mstc.edu/advising).



[mstc.edu](https://mstc.edu) • 888.575.6782 • TTY: 711



**ADAMS CAMPUS**  
401 North Main  
Adams, WI 53910

**MARSHFIELD CAMPUS**  
2600 West 5th Street  
Marshfield, WI 54449

**STEVENS POINT  
DOWNTOWN CAMPUS**  
1001 Centerpoint Drive  
Stevens Point, WI 54481

**WISCONSIN RAPIDS CAMPUS**  
500 32nd Street North  
Wisconsin Rapids, WI 54494

# CAREER PATHWAY • BEGIN AT ANY POINT



## CREDIT FOR PRIOR LEARNING AND EXPERIENCE

### CREDIT FOR PRIOR LEARNING AND EXPERIENCE

- Certifications and Licenses
- High School Credit
- Military Experience
- National/Standardized Exams
- Transfer Credit
- Work and Life Experience

Learn about Credit for Prior Learning at [mstc.edu/cpl](https://mstc.edu/cpl).

## ASSOCIATE IN APPLIED SCIENCE (AAS)

### ADVANCED MANUFACTURING TECHNOLOGY

Associate in Applied Science (AAS) • 62 Credits

#### Start Your Career

- Automation Technician
- Control Systems Technician
- Mechatronics Technician

## BACHELOR'S DEGREE

### BACHELOR'S DEGREE OPTIONS

For those interested in continuing their education, Mid-State offers transfer guides with various four-year colleges and universities. For more information and additional opportunities, visit [mstc.edu/transfer](https://mstc.edu/transfer).

## OTHER OPTIONS

### RELATED PROGRAMS

- Industrial Mechanical Technician
- Manufacturing Operations Management
- Metal Fabrication
- Precision Machining Technician
- Stainless Steel Welding
- Welding

### APPRENTICESHIP OPPORTUNITIES

- Electrical & Instrumentation Technician Apprenticeship

Employers will expect you, as an Advanced Manufacturing Technology graduate, to be able to:

- ## TECHNICAL SKILLS ATTAINMENT

## NOTES:

[illegible]

Visit **[mstc.edu/studenthandbook](https://mstc.edu/studenthandbook)** to view Mid-State's student handbook, which contains information about admissions, enrollment, appeals processes, services for people with disabilities, financial aid, graduation, privacy, Mid-State's Student Code of Conduct, and technology.

The GPS for Student Success course is required for all Mid-State program students and is recommended to be completed before obtaining 12 credits. (Not counted in the total credit value for this program.) Some students are exempt from this requirement. Please see your program advisor for more information.

**10890102 ..... 1 credit**

This course is recommended to be completed prior to obtaining 12 credits and is a graduation requirement unless you receive an exemption from your program advisor.

The following courses may be recommended or required if the student does not achieve minimum Accuplacer scores.

**10831104 .....3 credits**

Provides learners with opportunities to develop and expand reading and writing skills to prepare for college-level academic work. Students will employ critical reading strategies to improve comprehension, analysis, and retention of texts. Students will apply the writing process to produce well-developed, coherent, and unified written work.

**10834109 .....3 credits**

Provides an introduction to algebra. Includes operations on real numbers, solving linear equations, percent and proportion, and an introduction to polynomials and statistics. Prepares students for elementary algebra and subsequent algebra-related courses.

## SAMPLE FULL-TIME CURRICULUM OPTION

Term	16 credits
10462106 Mechanical Power Transmission	3
10605105 Electrical Circuits I ☑	3
10605117 Automation 1 - Beginning PLC ☑	3
10801136 English Composition 1 ☑	3
10804118 Intermediate Algebra with Applications ☑	4
Term	14 credits
10462133 Electric Controls for Industrial Automation	3
10605118 Automation 2 - Advanced PLC	3
10623114 Intro to Inventor	1
10664110 Intro to Mechatronics	2
10664120 Intro to Industrial Internet of Things	2
10801198 Speech ☑	3
Term	15 credits
10605119 Automation 3 - HMI's & Robotics	2
10605145 Industrial Networking	2
10623112 Manufacturing Practices	2
10664115 Engineering Drawings	2
10664121 Vision and Smart Sensors	2
10664123 Advanced Industrial Robotics	2
10809198 Intro to Psychology ☑ -OR-	
10809188 Developmental Psychology ☑	3
Term	17 credits
10196189 Team Building and Problem Solving	3
10462120 Industrial Hydraulics & Pneumatics	3
10664104 Industrial Control Systems Applications	2
10664124 Integrated Systems Capstone	3
10809195 Economics ☑	3
10804196 Trigonometry with Applications	3
<b>Total credits 62</b>	

☑ This course has options available to receive credit for prior learning (CPL) or work experience. Visit the website at [mstc.edu/cpl](http://mstc.edu/cpl) or contact your advisor for details.

Please Note:

- This curriculum sequence is only for student planning. Actual student schedules will vary depending on course availability.
- Program completion time may vary based on student scheduling and course availability. For details, go to [mstc.edu/schedule](http://mstc.edu/schedule).

## SAMPLE PART-TIME CURRICULUM OPTION

Term	10 credits
10605105 Electrical Circuits I ☑	3
10605117 Automation 1 - Beginning PLC ☑	3
10804118 Intermediate Algebra with Applications ☑	4
Term	8 credits
10605118 Automation 2 - Advanced PLC	3
10623114 Intro to Inventor	1
10664110 Intro to Mechatronics	2
10664120 Intro to Industrial Internet of Things	2
Term	8 credits
10462106 Mechanical Power Transmission	3
10605119 Automation 3 - HMI's & Robotics	2
10801136 English Composition 1 ☑	3
Term	6 credits
10462133 Electric Controls for Industrial Automation	3
10801198 Speech ☑	3
Term	6 credits
10623112 Manufacturing Practices	2
10664115 Engineering Drawings	2
10664121 Vision and Smart Sensors	2
Term	9 credits
10196189 Team Building and Problem Solving	3
10462120 Industrial Hydraulics & Pneumatics	3
10804196 Trigonometry with Applications	3
Term	7 credits
10605145 Industrial Networking	2
10664104 Industrial Control Systems Applications	2
10809198 Intro to Psychology ☑ -OR-	
10809188 Developmental Psychology ☑	3
Term	8 credits
10664123 Advanced Industrial Robotics	2
10664124 Integrated Systems Capstone	3
10809195 Economics ☑	3
<b>Total credits 62</b>	

## MULTIPLE MEASURES

**Multiple Measures Writing (MMW):** High school GPA of 2.6 and successful completion of 2.0 credits of high school writing courses with a "C" or better

**Multiple Measures Math 1 (MMM\_1):** High school GPA of 2.6 and successful completion of 1.0 credits of high school math (Algebra 1 or equivalent) with a "C" or better

**Multiple Measures Science 1 (MMS\_1):** High school GPA of 2.6 and successful completion of 1.0 credits of high school lab science course with a "C" or better

**Multiple Measures Reading (MMR):** High school GPA of 2.6 and successful completion of 2.0 credits of high school literature courses with a "C" or better

**Multiple Measures Math 2 (MMM\_2):** High school GPA of 2.6 and successful completion of 2.0 credits of high school math including Algebra 1 and Algebra 2 with a "C" or better

**Multiple Measures Science 2 (MMS\_2):** High school GPA of 2.6 and successful completion of 1.0 credits of high school chemistry with a "C" or better

*Past high school and college transcripts are used in making course placement decisions.*

# COURSE DESCRIPTIONS

## Advanced Industrial Robotics

**10664123.....2 credits**

In this course, students explore advanced programming techniques for industrial robots. They examine interfacing peripheral devices such as programmable logic controllers, industrial sensors, and human-machine interfaces to a robot. Upon completion of the course, students will be able to apply advanced programming techniques to industrial robots.

*Corequisite: Automation 3 - HMI's & Robotics 10605119*

## Automation 1 - Beginning PLC

**10605117 .....3 credits**

An overview of programmable logic controllers (PLCs) that provides a foundation of knowledge of the programming techniques, operation, and maintenance of PLCs used in typical industrial automation.

## Automation 2 - Advanced PLC

**10605118 .....3 credits**

A lab intensive course covering advanced PLC topics and programming techniques, analog I/O, VFDs, basic HMI interfaces, industrial robotics and troubleshooting.

*Prerequisite: Automation 1 - Beginning PLC 10605117 or consent of instructor*

## Automation 3 - HMI's & Robotics

**10605119 .....2 credits**

A lab intensive course covering advanced PLC programming techniques, HMI programming, industrial robotic systems interface, networking basics and troubleshooting of automation systems.

*Prerequisite: Automation 2 - Advanced PLC 10605118*

## Developmental Psychology

**10809188.....3 credits**

Studies human development throughout the lifespan and explores developmental theory and research with an emphasis on the interactive nature of the biological, cognitive, and psychosocial changes that affect the individual from conception to death. Application activities and critical thinking skills enable students to gain an increased knowledge and understanding of themselves and others.

*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English*

## Economics

**10809195 .....3 credits**

Provides an overview of how a market-oriented economic system operates and surveys the factors that influence national economic policy. Basic concepts and analyses are illustrated by reference to a variety of contemporary problems and public policy issues. Concepts include scarcity, resources, alternative economic systems, growth, supply and demand, monetary and fiscal policy, inflation, unemployment and global economic issues.

*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English*

## Electric Controls for Industrial Automation

**10462133.....3 credits**

Introduces the fundamentals of industrial motor controls, relay logic, ladder diagrams, industrial automation, and integrated manufacturing systems. The purpose of the course is to familiarize students with the terminology, capabilities, applications, and limitations of automated industrial controls through classroom and lab activities.

*Prerequisite: Electrical Circuits 1 10605105*

## Electrical Circuits I

**10605105 .....3 credits**

The study of Ohm's Law and its application to D.C. circuits. Major topics include: Ohm's Law, series circuits, parallel circuits, combination circuits, Kirchhoff's Laws, and power relationships.

*Corequisite: Intermediate Algebra with Applications 10804118 or College Mathematics 10804107*

## Engineering Drawings

**10664115 .....2 credits**

This course will acquaint the apprentice with the interpretation of engineering prints and other technical and manufacturing documentation. The primary focus of the course will be on that part of manufacturing most closely related to machining and tooling. Background information is provided relative to the process used to create and finish the product or piece part on the prints being studied.

## English Composition 1

**10801136 .....3 credits**

Learners develop and apply skills in all aspects of the writing process. Through a variety of learning activities and written documents, learners employ rhetorical strategies, plan, organize and revise content, apply critical reading strategies, locate and evaluate information, integrate and document sources, and apply standardized English language conventions.

*Prerequisite: High School GPA of 2.6 and MMW or Accuplacer Writing of 262 or ACT English score of 20 or completion of College Reading and Writing 1 10831104 with a "C" or better*

## Industrial Hydraulics & Pneumatics

**10462120 .....3 credits**

Studies basic principles of hydraulics and pneumatics. Covers the advantages, disadvantages, and inherent problems with these systems. Includes the principles of operation and the constructional features of pumps, motors, valves, seals, packing, and conductors as well as the physical properties of liquids. Students learn to identify various parts of a circuit and analyze them for their use.

*Prerequisite: Intermediate Algebra with Applications 10804118*

# COURSE DESCRIPTIONS

## Industrial Control Systems Applications

**10664104 .....2 credits**

In this course, learners develop machine process automation control systems with temperature, pressure, flow, and level controls. Learners investigate the utilization of PID loops in PLC program design. Learners program a PLC using vision, smart sensors, Servos, motor controls, and analog IO. Learners develop PLC programs including Human Machine Interface (HMI) with displays for machine input and output data. Upon completion of the course, learners will be able to build a PLC motion project for basic machine process automation control systems.

*Prerequisite: Automation 3 - HMI's & Robotics 10605119*

## Industrial Networking

**10605145 .....2 credits**

Students will study network infrastructure and communication languages commonly found in the industrial setting.

*Corequisite: Automation 1 - Beginning PLC 10605117*

## Integrated Systems Capstone

**10664124.....3 credits**

In this course, students design a complex integrated automation system. They use industrial robotics, programmable logic controllers, pneumatics/hydraulics, and sensors to develop the system. Upon successful completion, students will be able to design, program, troubleshoot, and improve a functional industrial automation system.

*Corequisite: Industrial Control Systems Applications 10664104*

## Intermediate Algebra with Applications ☑

**10804118 ..... 4 credits**

This course offers algebra content with applications. Topics include properties of real numbers; order of operations; algebraic solution for linear equations and inequalities; operations with polynomial and rational expressions; operations with rational exponents and radicals; and algebra of inverse, logarithmic, and exponential functions.

*Prerequisite: High School GPA of 2.6 and MMM\_1 or Accuplacer Arithmetic of 263 and QAS 234 or ACT Math score of 19 or QAS of 245 or Pre-Algebra 10834109 with a "C" or better*

## Intro to Industrial Internet of Things

**10664120 .....2 credits**

In this course, learners are introduced to theoretical and practical topics of the Industrial Internet of Things (IIoT). The learner investigates the range of sensor and actuator devices available, ways in which they communicate and compute, methods for getting information to and from IIoT-enabled devices, and ways of visualizing and processing data acquired from the IIoT. Upon completion, learners will utilize hardware and software to construct a sensor network within an existing system and utilize industry standard tools to visualize the acquired data.

## Intro to Inventor

**10623114 ..... 1 credit**

Learners will create 3D models in Inventor using a variety of feature and modify tools, analyze the volume of the models, and apply a material to determine weight of the finished product. Learners will generate 2D representations of the 3D model in appropriate views, and add dimensions and annotations before formatting drawings to print out. Prior experience with computers is recommended.

## Intro to Mechatronics

**10664110 .....2 credits**

In this course, learners are introduced to microprocessor controlled electromechanical systems. The learner examines how individual components work, and how they are integrated into simple systems. Upon completion of the course, learners will understand what technicians do in the workplace and how industry utilizes Mechatronics in advanced manufacturing.

*Prerequisite: High School GPA of 3.0 or Accuplacer Reading Skills of 236, Writing of 237 or ACT of 15 Reading/16 Writing. Students are encouraged to bring transcripts for further evaluation if they do not meet these requirements; Corequisite: Automation 1 - Beginning PLC 10605117*

## Intro to Psychology ☑

**10809198 .....3 credits**

This science of psychology course is a survey of multiple aspects of behavior and mental processes. It provides an overview of topics such as research methods, theoretical perspectives, learning, cognition, memory, motivation, emotions, personality, abnormal psychology, physiological factors, social influences, and development.

*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English*

## Manufacturing Practices

**10623112.....2 credits**

As competition for market share continues to increase, manufacturers rely on innovations in technology, methods, and practices to give them the edge they need. To remain competitive globally, the watchwords are productivity, efficiency, and quality. In this course, students examine some of the practices that many manufacturing operations have come to rely on to make their operations competitive, efficient, and cost-effective. Topics covered in this class include the principles of lean manufacturing, value versus non-value added waste, 5S methodology, value stream mapping, setup reduction and quick changeover, cellular flow, building a lean culture, total productive maintenance, and statistical process control (SPC).

## Mechanical Power Transmission

**10462106 .....3 credits**

A study of the systems and components that transmit power from the prime mover through the system. Gear trains, linkages, clutches, couplings, and flexible drives are evaluated mathematically in lab situations.



# COURSE DESCRIPTIONS

## Speech

### **10801198 .....3 credits**

Explores the fundamentals of effective oral presentation to small and large groups. Topic selection, audience analysis, methods of organization, research, structuring evidence and support, delivery techniques, and other essential elements of speaking successfully, including the listening process, form the basis of this course. Includes informative, persuasive, and occasion speech presentations.

*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 253 and Writing of 262 or ACT of 21 Reading/19 English or completion of College Reading and Writing 1 10831104 with a "C" or better*

## **Team Building and Problem Solving**

### **10196189 .....3 credits**

Applies skills and tools necessary to facilitate problem solving in a team environment. Each learner assumes the roles and responsibilities of team leadership in the stages of team development, uses a systematic problem-solving process, and employs consensus-building and conflict-management strategies.

## **Trigonometry with Applications**

### **10804196 .....3 credits**

Topics include circular functions, graphing of trigonometry functions, identities, equations, trigonometric functions of angles, inverse functions, solutions of triangles, complex numbers, DeMoivre's Theorem, polar coordinates, and vectors. *Prerequisite: ACT Math score of 22 or Intermediate Algebra with Applications 10804118 with a "C" or better*

## **Vision and Smart Sensors**

### **10664121 .....2 credits**

In this course, learners will utilize 2D cameras, lighting systems and smart sensors in machine applications to provide imaging-based automatic inspection and analysis for such applications as automatic inspection, process control, and robot guidance. Learners will use vision systems to: sort good and bad parts; identify, position and orient objects images for robot guidance and orientation using edge detection; blob detection; pattern recognition; image acquisition; and bar code and QR code recognition. Learners will integrate smart sensors into PLC machine applications. Upon completion of this course learners will apply camera and smart sensors into a machine process application.

*Prerequisite: Automation 2 - Advanced PLC 10605118*