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

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**.

CHECKLIST:
This section will be completed when meeting with your academic advisor.

❑ FAFSA (www.fafsa.gov)

❑ Financial Aid Form(s)

  Form(s): _____

❑ Follow-Up Appointment:

  Where: _____

  When:_____

  With:_____

❑ Official Transcripts
  Mid-State Technical College
  Student Services Assistant
  1001 Centerpoint Drive
  Stevens Point, WI 54481

❑ Other:_____

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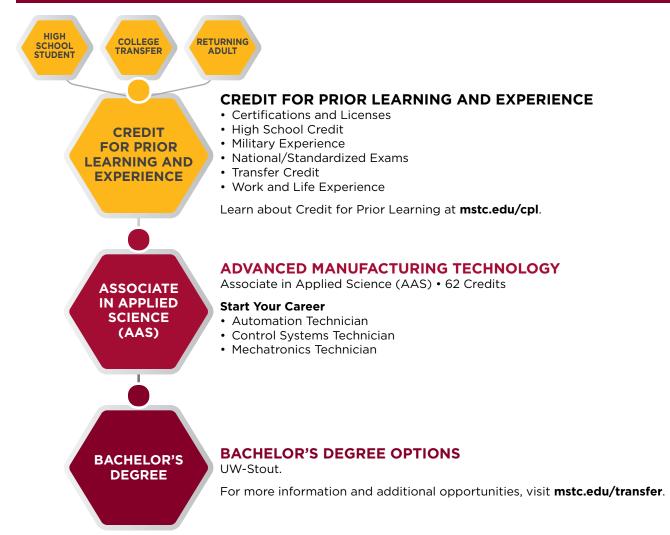
MID-STATE TECHNICAL COLLEGE

ADAMS CAMPUS
401 North Main
Adams, WI 53910

MARSHFIELD CAMPUS
2600 West 5th Street
Marshfield, WI 54449

STEVENS POINT CAMPUS
1001 Centerpoint Drive
Stevens Point, WI 54481

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

HIGH SCHOOL STUDENT

COLLEGE TRANSFER

RETURNING ADULT

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**.

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
UW-Stout.

For more information and additional opportunities, visit **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

OUTCOMES

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

- Apply state and national safety rules to the manufacturing systems environment.
- Analyze automation within a complex manufacturing system.
- Manage advanced manufacturing systems for operational efficiency and cost control.
- Analyze technical specifications for implementation of manufacturing systems, modules, and components.
- Explore a Proportional Integral Derivative (PID) control system to achieve a desired outcome in a manufacturing outcome.
- Integrate industrial control systems into manufacturing processes.
- Apply electronic principles to devices within a complex manufacturing systems.

TECHNICAL SKILLS ATTAINMENT

The Wisconsin Technical College System (WTCS) has implemented a requirement that all technical colleges measure outcomes attained by students. This requirement is called Technical Skills Attainment (TSA). The main objective of TSA is to ensure graduates have the technical skills needed by employers. Students are notified of TSA reporting in their final few courses of the program.

NOTES:

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STUDENT HANDBOOK

Visit **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.

GRADUATION REQUIREMENT

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.

GPS for Student Success ✍
10890102 ....1 credit
Integrate necessary skills for student success by developing an academic plan, identifying interpersonal attributes for success, adopting efficient and effective learning strategies, and utilizing Mid-State resources, policies, and processes. 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.

ADDITIONAL COURSES AS NEEDED

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

College Reading and Writing 1
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.

Pre-Algebra
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
10664104	Industrial Control Systems Applications	2
10664115	Engineering Drawings	2
10664121	Vision and Smart Sensors	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
10664123	Advanced Industrial Robotics	2
10664124	Integrated Systems Capstone	3
10809195	Economics ☑	3
10804196	Trigonometry with Applications	3

Total credits 62

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

Total credits 62

☑ This course has options available to receive credit for prior learning (CPL) or work experience. Visit the website at **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**.

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 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 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 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 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 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.

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 1 - Beginning PLC 10605117

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

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

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 forbasic machine process automation control systems.

Industrial Networking
10605145 ....2 credits
Students will study network infrastructure and communication languages commonly found in the industrial setting.

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.

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, methodsfor 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 visual 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.

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.

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.