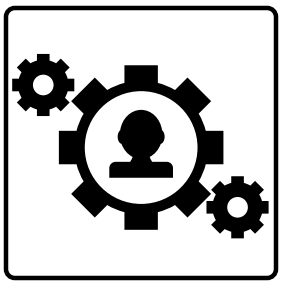

# MECHANICAL DESIGN TECHNOLOGY

## Associate in Applied Science (AAS)
## Program Code: 10-606-1
## Total Credits: 63-64

This program prepares graduates to work with engineers to design, prepare, develop, and test all types of machines and products. Students learn to apply knowledge of mechanical engineering technology and use 2D and 3D computer-aided design applications. They also learn about manufacturing processes, material strength, basic mechanisms, and three-dimensional modeling. You'll gain an understanding of complex systems and how parts and pieces work together. You will also learn about and use research and development (R&D) processes, such as prototyping, testing, and QA, and how these are applied in the world of manufacturing. Hands-on projects include building parts to make mechanical systems as well as first-hand experience with scanning and modeling parts, 3D printing parts, and additive manufacturing.

**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**.

### 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**.
- ❑ 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**. 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**.
- ❑ Set up student MyCampus account at **mstc.edu/mycampus-assistance**.
- ❑ Schedule a New Student Advising appointment at **mstc.edu/advising**.



Mid-State does not discriminate on the basis of race, color, national origin, sex, disability, or age in its program, activity, or employment. The following person has been designated to handle inquiries regarding the nondiscrimination policies: Vice President – Human Resources; 500 32nd Street North, Wisconsin Rapids, WI 54494; 715.422.5325 • AAEO@mstc.edu. 3/2025

# CAREER PATHWAY • BEGIN AT ANY POINT


## 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**.

## MECHANICAL DESIGN TECHNOLOGY

Associate in Applied Science (AAS) • 63-64 Credits

**Start Your Career**

- Mechanical Design Technician
- Product Designer
- CAD Technician

## BACHELOR'S DEGREE OPTIONS

For those interested in continuing their education, Mid-State offers transfer agreements with various four-year colleges and universities. For more information and additional opportunities, visit **mstc.edu/transfer**.

## OTHER OPTIONS

### RELATED PROGRAMS

- Automation & Instrumentation Technology
- Civil Engineering Technology-Highway Technician

## OUTCOMES

Employers will expect you, as an Mechanical Design Technology graduate, to be able to:

- Prepare detail and assembly drawings for documentation of mechanical components and products
- Create CAD geometry, parts and assemblies
- Design mechanical components and products
- Analyze mechanical engineering problems
- Select purchased parts

## 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 will be notified throughout the program how they are going to fulfill the TSA requirement.

## NOTES:

## 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 | | 15 credits |
|---|---|---|
| 10420101 | Manufacturing Processes - Machining | 2 |
| 10606163 | Materials of Industry | 2 |
| 10606164 | Technical Detailing | 2 |
| 10623106 | Introduction to AutoCAD | 1 |
| 10623114 | Intro to Inventor | 1 |
| 10801136 | English Composition 1 ✎ | 3 |
| 10804118 | Intermediate Algebra with Applications ✎ | 4 |

| Term | | 17 credits |
|---|---|---|
| 10457119 | Fabrication Fundamentals 1 ✎ | 1 |
| 10457120 | Fabrication Fundamentals 2 ✎ | 1 |
| 10606106 | Intermediate AutoCAD | 2 |
| 10606114 | Machine Design 1 | 2 |
| 10606131 | Strengths of Materials | 3 |
| 10606145 | Applied Mechanics | 2 |
| 10804196 | Trigonometry with Applications | 3 |
| 10809166 | Intro to Ethics: Theory & Application ✎ **-OR-** | |
| 10809172 | Introduction to Diversity Studies ✎ | 3 |

| Term | | 17-18 credits |
|---|---|---|
| 10606115 | Machine Design 2 | 3 |
| 10606117 | Designing for Manufacturability | 3 |
| 10606119 | Mechanisms | 3 |
| 10606165 | Intro to Solidworks | 1 |
| 10623176 | Quality Assurance | 1 |
| 10801198 | Speech ✎ **-OR-** | |
| 10801196 | Oral/Interpersonal Communication ✎ | 3 |
| 10806143 | College Physics 1 | 3 |
| | **-OR-** | |
| 10806154 | General Physics 1 ✎ | 4 |

| Term | | 14 credits |
|---|---|---|
| 10462120 | Industrial Hydraulics & Pneumatics | 3 |
| 10606113 | Tool and Fixture Design | 2 |
| 10606166 | Intermediate Solidworks | 1 |
| 10623171 | Lean Six Sigma | 3 |
| 10809198 | Introduction to Psychology ✎ **-OR-** | |
| 10809188 | Developmental Psychology ✎ | 3 |
| 32420325 | Inspection with Geometric Dimensioning | 2 |

**Total credits 63-64**

✎ 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**.

## SAMPLE PART-TIME CURRICULUM OPTION

| Term | | 10 credits |
|---|---|---|
| 10420101 | Manufacturing Processes - Machining | 2 |
| 10606163 | Materials of Industry | 2 |
| 10623106 | Introduction to AutoCAD | 1 |
| 10623114 | Intro to Inventor | 1 |
| 10804118 | Intermediate Algebra with Applications ✎ | 4 |

| Term | | 10-11 credits |
|---|---|---|
| 10457119 | Fabrication Fundamentals 1 ✎ | 1 |
| 10457120 | Fabrication Fundamentals 2 ✎ | 1 |
| 10606106 | Intermediate AutoCAD | 2 |
| 10804196 | Trigonometry with Applications | 3 |
| 10806143 | College Physics 1 | 3 |
| | **-OR-** | |
| 10806154 | General Physics 1 ✎ | 4 |

| Term | | 8 credits |
|---|---|---|
| 10606164 | Technical Detailing | 2 |
| 10801136 | English Composition 1 ✎ | 3 |
| 10809166 | Intro to Ethics: Theory & Application ✎ **-OR-** | |
| 10809172 | Introduction to Diversity Studies ✎ | 3 |

| Term | | 7 credits |
|---|---|---|
| 10606114 | Machine Design 1 | 2 |
| 10606131 | Strengths of Materials | 3 |
| 10606145 | Applied Mechanics | 2 |

| Term | | 6 credits |
|---|---|---|
| 10606115 | Machine Design 2 | 3 |
| 10801198 | Speech ✎ **-OR-** | |
| 10801196 | Oral/Interpersonal Communication ✎ | 3 |

| Term | | 8 credits |
|---|---|---|
| 10462120 | Industrial Hydraulics & Pneumatics | 3 |
| 10809198 | Introduction to Psychology ✎ **-OR-** | |
| 10809188 | Developmental Psychology ✎ | 3 |
| 32420325 | Inspection with Geometric Dimensioning | 2 |

| Term | | 8 credits |
|---|---|---|
| 10606117 | Designing for Manufacturability | 3 |
| 10606119 | Mechanisms | 3 |
| 10606165 | Intro to Solidworks | 1 |
| 10623176 | Quality Assurance | 1 |

| Term | | 6 credits |
|---|---|---|
| 10606113 | Tool and Fixture Design | 2 |
| 10606166 | Intermediate Solidworks | 1 |
| 10623171 | Lean Six Sigma | 3 |

**Total credits 63-64**

| 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

**Applied Mechanics**
**10606145 .....2 credits**
Learners develop a thorough understanding of statics and mechanics principles found in mechanical design. Learners will apply mechanics principles in various assignments and lab activities.

**College Physics 1**
**10806142 .....3 credits**
Presents the applications and theory of basic physics principles. This course emphasizes problem solving, laboratory investigation and applications. Topics include laboratory safety, unit conversions and analysis, kinematics, dynamics, work, energy, power, temperature and heat.
*Corequisite: Trigonometry with Applications 10804196*

**Designing for Manufacturability**
**10606117 .....3 credits**
Utilize industry accepted methods for the design and development of customer focused products. Emphasis is placed on team building and the application of industry practices for the efficient and cost-effective design, development and production of products. The learner will incorporate design considerations for specific manufacturing processes into product design. Current industry methods of product design and re-engineering will be used to complete product design projects.

**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*

**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*

**Fabrication Fundamentals 1**
**10457119.....1 credit**
An introduction to structural shapes and sheet metal fabrication. Presents fabrication techniques, metal selection, and layout, cutting, bending, drilling, threading, and joining using manual equipment and techniques. Information is presented to the student and followed up with lab activities to provide a hands-on experience. Emphasizes developing an understanding of the tools, techniques, safe work habits, and application of sheet metal fabrication skills.

**Fabrication Fundamentals 2**
**10457120.....1 credit**
An introduction to plate steel and heavy fabrication. Presents fabrication techniques using heavy fabrication equipment. CNC Cutting, Plate and Tube bending, Sawing and Shearing equipment will be presented and followed up with lab activities to provide a hands-on experience. Emphasizes developing an understanding of the equipment, techniques, safe work habits, and application of heavy metal fabrication skills.

**General Physics 1**
**10806154 ..... 4 credits**
Presents the applications and theory of basic physics principles. This course emphasizes problem solving, laboratory investigation, and applications. Topics include unit conversion and analysis, vectors, translational and rotational kinematics, translational and rotational dynamics, heat and temperature, and harmonic motion and waves.
*Corequisite: Trigonometry with Applications 10804196*

**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*

**Inspection with Geometric Dimensioning**
**32420325.....2 credits**
This course will familiarize learners with interpreting Geometric Dimensioning and introduce dimensional metrology. Activities and classroom presentations will provide insight into the use of direct and indirect measuring tools, instrument calibration, and the use of Coordinate Measuring Machines, and quality documentation. Emphasis of the course will be on interpretation of Geometric Dimensioning and using metrology fundamentals to ensure manufactured components meet design specifications.

**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*

**Intermediate AutoCAD**
**10606106 .....2 credits**
Applies intermediate to advanced AutoCAD functions and shortcuts, expanding knowledge from Technical Drafting / CAD. Explores the 3D modeling functions in AutoCAD. Applies these skills to create auxiliary views, section views and complex assemblies. The learner will create a variety of working drawings using the mechanical drawing skills obtained in the prerequisite courses and the AutoCAD software to increase skills and efficiency.
*Prerequisite: Introduction to AutoCAD 10623106*

**Intermediate Solidworks**
**10606166 .....1 credit**
Introduces the learner to intermediate SolidWorks commands to produce 3- dimensional parts, assemblies and engineering drawings. The learner will utilize and practice their existing beginner level commands and skills while mastering intermediate level skills with an emphasis on mechanical engineering drafting and design.

**Intro to Ethics: Theory & Application**
**10809166 .....3 credits**
Provides a basic understanding of the theoretical foundations of ethical thought. Diverse ethical perspectives are used to analyze and compare relevant issues. Students critically evaluate individual, social, and/or professional standards of behavior, and apply a systemic decision-making process to these situations.
*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*

**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 Solidworks**
**10606165 .....1 credit**
Introduces the learner to basic SolidWorks commands to produce 3-dimentsional parts, assemblies and engineering drawings. The learner will master beginner level commands and have a thorough understanding of the basic operation of the software.

**Introduction to AutoCAD**
**10623106 .....1 credit**
This introductory course in computer-aided drafting (CAD) using AutoCAD software provides foundation skills in using CAD software to create and print two-dimensional technical drawings. This course is available to students in any program. Computer skills and prior knowledge of drawing/ drafting techniques is recommended.

**Introduction to Diversity Studies**
**10809172.....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*

**Introduction 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*

**Lean Six Sigma**
**10623171.....1 credit**
Learners will examine methods used in Lean Six Sigma to implement continuous improvement projects in the workplace. Concepts identified in this course cover problem solving tools, root cause analysis and project management using the DMAIC model. Learners will incorporate basic statistics to support projects and explore the Lean Six Sigma 'body of knowledge' providing skills to achieve Lean Six Sigma Green Belt certification.

**Machine Design 1**
**10606115 .....2 credits**
Emphasizes horsepower, torque and speed regarding machine design requirements. The learner will be capable of proper selection of commercially available power transmission chain and belt drives, couplings, clutches, brakes and gear reducers, as wellas the selection of electric motors and small two and four cycle gasoline engines.

**Machine Design 2**
**10606115 .....3 credits**
Incorporates the concepts learned in Strengths of Materials and applies them to 3-dimensional applications. The learner will master the basic concepts of fatigue strength, the use of stress concentration factors, de-rating factors and factors of safety in order to compare design loads to material properties of objects in their actual working environment. The learner will understand all aspects of shaft design and will be able to properly account for all considerations when designing common machine components.
*Prerequisite: Strengths of Materials 10606131*

**Manufacturing Processes - Machining**
**10420101.....2 credits**
Learners will be introduced to manufacturing methods and the progression a part follows from raw material to finished product following supplied drawings. Learners will practice techniques in standard machining processes, methods, and procedures to safely machine materials using manufacturing equipment including manual milling machines and manual lathes.

**Materials of Industry**
**10606163 .....2 credits**
Learners are involved in the examination of manufacturing materials related to the ultimate design decision involved in part and product design. Students will learn the principles and theory of material selection, properties of materials, structures of materials and specific materials and their function in product application.

**Mechanisms**
**10606119 .....3 credits**
Analyzes existing mechanisms and their motion characteristics with application to the design of machines. Four bar linkages, slider cranks, cams, gears and other typical mechanisms are examined. The effects that displacement, velocity and acceleration have on mechanisms will be studied.

**Oral/Interpersonal Communication**
**10801196 .....3 credits**
Focuses on developing effective listening techniques and verbal and nonverbal communication skills through oral presentation, group activity, and other projects. The study of self, conflict, and cultural contexts will be explored, as well as their impact on communication.
*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*

**Quality Assurance**
**10623176.....1 credit**
Analyzes the philosophies and strategies the American industry has been focusing on to improve the quality of their products and services. The learner will explore their personal philosophy on quality, the cost of quality, total quality management, and nonconforming products and materials.

**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*

**Strengths of Materials**
**10606131 .....3 credits**
Examines how forces affect machine members and structural elements. The learner will calculate stress and strain, analyze connections and evaluate beams and columns. The learner will use these calculations to determine if a given design will perform or fail.

**Technical Detailing**
**10606164 .....2 credits**
Expands basic knowledge and skill development of mechanical drawing. Emphasis is placed on fits and tolerances, geometric and positional dimensioning and tolerancing, assembly and detail drawings and parts lists.

**Tool and Fixture Design**
**10606113 .....2 credits**
Develops an in-depth understanding of production systems control and planning. The learner will acquire the skills necessary for the design and creation of engineering drawings of production tools and work holder devices such as jigs and fixtures.

**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*