METAL FABRICATION

Technical Diploma
Program Code: 31-457-2
Total Credits: 30

Mid-State's Metal Fabrication program prepares graduates for jobs as fabricators, fitters, mill beam fitters, welder-fabricators, structural-steel fabricators, weld technicians, and structural steel fitters. Students will work with a variety of metals and learn to produce and assemble structural metal products for machinery, ovens, tanks, pipes, stacks, and parts for buildings. They will learn the physical properties of metals and how to read job orders and blueprints. This program prepares students with an understanding of basic design, types of materials and their uses, weld types, and material fitting. Students train on equipment found in local industry and learn to operate press brakes, industrial hydraulic shears, ironworkers, CNC plasma cutting tables, robotic welders, plate rollers, grinders, welders, and various other metal cutting and fitting equipment.

To learn more about this program, visit **mstc.edu/programs**.

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
  500 32nd Street North
  Wisconsin Rapids, WI 54494
- 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**.

CAREER PATHWAY

Career pathways help you build your education step by step. Each stage offers one or more credentials that are recognized by employers and lead to real jobs—and you can keep building toward your career goals as you go.

Begin at any point.

Prior Learning

Credit for Prior Learning

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

Learn about Credit for Prior Learning at **mstc.edu/cpl**.

High School Credit

- High School Dual Credit
- Mid-State Fast Track

Learn about High School Credit at **mstc.edu/dc**.

Technical Diploma

- Metal Fabrication (30 Credits)
  Start Your Career: Fabricator, Fitter, Metalworker, Welder-Fabricator

Bachelor's Degree

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

Other Options

Related Programs: Advanced Manufacturing Technology, Industrial Mechanical Technician, Manufacturing Operations Management, Precision Machining Technician, Stainless Steel Welding, Welding

Apprenticeship Opportunity: Ironworker

OUTCOMES

Employers will expect you, as a Metal Fabrication graduate, to be able to:

- Demonstrate industry recognized safety practices.
- Form materials to detailed drawings.
- Cut materials to detailed drawings.
- Join materials to detailed drawings.
- Layout components/assemblies.
- Inspect product.

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. Faculty will let students know when and how the TSA is being assessed in the program.

PROTECTIVE CLOTHING

Students are required to provide their own protective clothing and equipment. Details of the requirements and where they may be purchased are provided by the program instructor at the beginning of each semester.

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. Some students are exempt from this requirement. Please see your academic advisor for more information.

ADDITIONAL COURSES AS NEEDED

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

MULTIPLE MEASURES

Students can place into courses using high school GPA and completed classes. Placement can be determined in the following ways:

- **Multiple Measures Writing (MMW)**
  High school GPA of 2.6 & 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 & 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 & successful completion of 1.0 credit 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 & 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 & successful completion of 1.0 credit of high school lab science course with a "C" or better
- **Multiple Measures Science 2 (MMS_2)**
  High school GPA of 2.6 & successful completion of 1.0 credit of high school chemistry with a "C" or better

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

SAMPLE FULL-TIME CURRICULUM OPTION

Metal Fabrication • 30 Total Credits

Term 16 Credits

Course Number	Course Name	CPL	Credits
10457119	Fabrication Fundamentals 1	No	1
10457120	Fabrication Fundamentals 2	No	1
10623106	Introduction to AutoCAD	Yes	1
10623114	Intro to Inventor	Yes	1
31442317	Print Reading for Welding	No	1
31442323	GMAW: Introduction	No	2
31442324	GMAW: Stainless & Aluminum	No	2
31442325	FCAW: Introduction	No	2
31442413	Technical Math for Welding and Fabrication	No	1
31457400	Measurement and Layout	No	1
31457404	Material Handling for Metal Fabrication	No	1
31462318	Safety for Industrial Trades	Yes	1
10890102	GPS for Student Success	Yes	1

Term 14 Credits

Course Number	Course Name	CPL	Credits
10442115	Welding Fabrication Techniques	No	2
31442314	Gas Tungsten Arc Welding: Intro	No	2
31442316	Metallurgy for Welding	No	1
31442322	Robotic Welding	No	2
31457401	Metal Fabrication for Pipe	No	2
31457402	Metal Fabrication for Plate	No	2
31457403	CNC Programming and Operation	No	1
31462302	Machine Shop Foundations	No	2

Please Note

- Credit for Prior Learning (CPL) options are available for some courses. You can visit **mstc.edu/cpl** or contact your academic advisor for details.
- 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**.
- Get the latest updates online at **mstc.edu**.

SAMPLE PART-TIME CURRICULUM OPTION

Metal Fabrication • 30 Total Credits

Term 10 Credits

Course Number	Course Name	CPL	Credits
10623106	Introduction to AutoCAD	Yes	1
31442317	Print Reading for Welding	No	1
31442323	GMAW: Introduction	No	2
31442324	GMAW: Stainless & Aluminum	No	2
31457400	Measurement and Layout	No	1
31457404	Material Handling for Metal Fabrication	No	1
31462318	Safety for Industrial Trades	Yes	1
10890102	GPS for Student Success	Yes	1

Term 8 Credits

Course Number	Course Name	CPL	Credits
31442316	Metallurgy for Welding	No	1
31457401	Metal Fabrication for Pipe	No	2
31457402	Metal Fabrication for Plate	No	2
31457403	CNC Programming and Operation	No	1
31462302	Machine Shop Foundations	No	2

Term 6 Credits

Course Number	Course Name	CPL	Credits
10457119	Fabrication Fundamentals 1	No	1
10457120	Fabrication Fundamentals 2	No	1
10623114	Intro to Inventor	Yes	1
31442325	FCAW: Introduction	No	2
31442413	Technical Math for Welding and Fabrication	No	1

Term 6 Credits

Course Number	Course Name	CPL	Credits
10442115	Welding Fabrication Techniques	No	2
31442314	Gas Tungsten Arc Welding: Intro	No	2
31442322	Robotic Welding	No	2

CNC Programming and Operation
31457403
1 credit
Introduces fundamental concepts of CNC programming as related to metal fabrication. Learners apply concepts by creating and running simple programs with a welding robot, thermal shape-cutting system, and a press brake.

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.

FCAW: Introduction
31442325
2 credits
In this course, learners will develop skills in the flux core arc welding (FCAW) process by creating weldments across various welding positions. They will gain a thorough understanding of electrode types, flux compositions, and shielding gases suitable for different materials. Additionally, learners will practice reading weld symbols and interpreting written welding procedures, enhancing their technical comprehension and hands-on abilities in FCAW techniques. This course prepares students with foundational knowledge and skills for effectively working with flux core welding in real-world applications.
Corequisite: GMAW: Stainless & Aluminum 31442324

Gas Tungsten Arc Welding: Intro
31442314
2 credits
Learners will use GTAW processes to weld common production welding joints with various materials.

GMAW: Introduction
31442323
2 credits
Learners will focus on the gas metal arc welding (GMAW) process to create weldments on mild steel sheet metals and plates. They will work in various welding positions, applying axial spray, pulse spray, and short circuit transfer modes. Emphasis will be placed on interpreting written welding procedures and understanding weld symbols, ensuring learners develop a foundational grasp of essential welding techniques and standards used in the industry.
Corequisite: Welding Foundations 1 31442320

GMAW: Stainless & Aluminum
31442324
2 credits
In this advanced gas metal arc welding (GMAW) course, learners will concentrate on welding stainless steel and aluminum sheet metals and plates, using specialized techniques. They will learn to differentiate and select appropriate electrodes and shielding gases for different base metals, as well as accurately adjust parameters for optimal results. The course emphasizes mastery of axial spray, pulse spray, and short circuit transfer modes, tailored to the specific properties of stainless steel and aluminum. Through hands-on practice, learners will deepen their understanding of advanced GMAW processes and their applications in diverse welding scenarios.
Corequisite: GMAW: Introduction 31442323

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.

Introduction to AutoCAD
10623106
1 credit
Learners will develop practical approaches to constructing basic 2D drawings in AutoCAD software by drawing, modifying, and assigning appropriate layer properties. Learners will also analyze length and area of shapes drawn in AutoCAD, summarize details through dimensions and annotations added to the drawings, and format the drawings for printing. Prior experience with computers is recommended.

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.

Machine Shop Foundations
31462302
2 credits
This introductory course in machining will provide basic content related to shop safety, identification of common machine tools, their functions, and the basic processes they perform, and lab activities which will include basic setup and operations.

Material Handling for Metal Fabrication
31457404
1 credit
This course prepares students with the skills and knowledge necessary for safe and effective material handling in metal fabrication environments. Students will learn to identify and inspect rigging equipment, ensuring proper safety standards are met. They will gain hands-on experience in safely rigging loads and will demonstrate safe operation techniques for cranes and forklifts. By the end of the course, students will be equipped to handle materials efficiently and safely, reducing risks and improving workplace safety in fabrication settings.
Prequisite: GMAW: Student must be 18 years old at start of course

Math for Manufacturing
32420320
2 credits
Studies Welding and Fabrication problems involving calculations with fractions, decimals, percentages, measurements and conversions. Includes work with the metric system, measurement conversion, shapes, formulas for circumference area and volume and use of a scientific calculator. Formulas with application to bending metal are also studied.
Prerequisite: Admission into Precision Machining Technician 3142010 program, Welding program 314421, Gas Tungsten Arc Welding (Stainless Steel) 304427, or consent of instructor

Measurement and Layout
31457400
1 credit
An introduction to measurement scales and the different tools used in fabrication. An introduction into the different layout methods used for pipe and plate fabrication incorporating angles, arcs and area.

Metal Fabrication for Pipe
31457401
2 credits
An introduction into pipe fabrication where students will learn how to use the different machines involved with pipe bending, rolling, coping and cutting. Students will also learn accurate measuring and layout methods pertaining to bending and rolling.
Corequisite: Fabrication Fundamentals 1 10457119, Fabrication Fundamentals 2 10457120

Metal Fabrication for Plate
31457402
2 credits
An introduction into plate fabrication where students will learn how to use the different machines involved with bending, rolling and cutting plate material. Students will also learn accurate measuring and layout methods involved with bending and rolling of plate material.
Corequisite: Fabrication Fundamentals 1 10457119, Fabrication Fundamentals 2 10457120

Metallurgy for Welding
31442316
1 credit
Investigates the effects of welding on the mechanical properties of metals. Learners explore hardness, strength, and weldability of various metals. Concepts are applied in various activities including heat treating, hardness testing, and tensile testing.

Print Reading for Welding
31442317
1 credit
Learners will view, interpret, and create multi-view orthographic projection drawings, print symbols and dimensioning standards.

Robotic Welding
31442322
2 credits
An introduction into the operation, set-up and uses for robots in the welding industry. Students will learn simple teach pendant techniques, perform CNC basics for making programs and utilizing welding knowledge for proper set-up of the robots, students will perform multiple functions to produce quality weldments performed by the robot.

Safety for Industrial Trades
31462318
1 credit
This course introduces basic concepts of safety, health, and environmental issues. Hazards and harm reduction protocols are covered, and completion of Occupational Safety and Health Administration (OSHA) 10-hour general industry certification is included in the course.

Technical Math for Welding and Fabrication
31442413
1 credit
In this course, students will gain essential math skills tailored for welding and fabrication applications, enhancing their accuracy and efficiency in real-world settings. Students will develop proficiency in working with whole numbers, fractions, and decimals, and will perform conversions and calculations in both the imperial and metric systems. They will learn to use common welding measurement tools and calculate important dimensions such as perimeter, circumference, area, and volume for standard shapes like triangles, squares, and circles. Additionally, students will perform calculations for project estimation, design, production analysis, and metal forming processes.

Welding Fabrication Techniques
10442115
2 credits
Students fabricate parts from prints and weld assemblies with a specified welding process. Cutting and forming may be required prior to assembly. Depending on the size and complexity of the project, students may be asked to work in a team to complete an assignment.
Prerequisite: GMAW: Introduction 31442323; Corequisites: Metal Fabrication for Pipe 31457401, Metal Fabrication for Plate 31457402