



# RENEWABLE ENERGY TECHNICIAN

**Associate in Applied Science (AAS)**  
**Program Code: 10-482-3**  
**Total Credits: 61**

The only program of its kind in the Wisconsin Technical College System, Mid-State's Renewable Energy Technician program prepares students to design an integrated portfolio of renewable and traditional energy-producing systems. Graduates develop a working knowledge of "green" building concepts and energy-efficient design principles as well as the foundation needed for an entry-level position in the heating, ventilation, and air conditioning (HVAC) fields. In this program you'll learn to perform site assessments and recommend appropriate renewable energy technologies, sell and market renewable energy technologies, and manage renewable energy installation projects. Mid-State's unique facilities, a variety of brands of equipment and software for training, experienced faculty, and off-campus design opportunities make this program one-of-a-kind.

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

### CHECKLIST:

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

- FAFSA ([www.fafsa.gov](http://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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**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

# CAREER PATHWAY • BEGIN AT ANY POINT

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](https://mstc.edu/cpl).

## TECHNICAL DIPLOMA

### CONSTRUCTION TRADES

Technical Diploma • 11 Credits

#### Start Your Career

- Electrical Contracting Laborer
- Carpentry Contracting Laborer
- Plumbing Contracting Laborer
- Apprenticeship

### HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) INSTALLER

Technical Diploma • 25 Credits

#### Start Your Career

- Building Controls Technician
- Heating, Ventilation, and Air Conditioning Installer
- Heating and Air Conditioning Mechanic
- Apprenticeship

## ASSOCIATE IN APPLIED SCIENCE (AAS)

### RENEWABLE ENERGY TECHNICIAN

Associate in Applied Science (AAS) • 61 Credits

#### Start Your Career

- Energy Load Estimator
- Renewable Energy Technical Sales Representative
- Solar Installer
- Apprenticeship

## BACHELOR'S DEGREE

### BACHELOR'S DEGREE OPTIONS

Arizona State University, Bellevue University, Colorado State University Global, Concordia University, Franklin University, Grand Canyon University (GCU), Lakeland University, Milwaukee School of Engineering (MSOE), Mount Mary University (MMU), Northern Michigan University, University of Phoenix, UW-Green Bay, UW-Oshkosh, UW-River Falls, UW-Stevens Point, UW-Stevens Point at Marshfield, UW-Stout, UW-Whitewater, Western Governors University, and Wisconsin Private-Nonprofit Universities/Colleges.

For more information and additional opportunities, visit [mstc.edu/transfer](https://mstc.edu/transfer).

## OTHER OPTIONS

### APPRENTICESHIP OPPORTUNITIES

- Carpenter Apprenticeship
- Construction Electrician (ABC) Apprenticeship
- Construction Electrician (IBEW-NECA) Apprenticeship
- Plumber Apprenticeship
- Steamfitter and Steamfitter Service Apprenticeship

## PROGRAM OUTCOMES

Employers will expect you, as a Renewable Energy Technician graduate, to be able to:

- Perform site assessments for solar photovoltaic, solar thermal, and small wind systems.
- Conduct feasibility studies regarding installation of renewable energy systems.
- Design an integrated portfolio of renewable energy systems.
- Respond to customer inquiries.
- Manage renewable energy system installation projects.
- Sell renewable energy systems.

## TECHNICAL SKILLS ATTAINMENT

The Wisconsin Technical College System (WTCS) has implemented a requirement that all technical colleges measure program 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 fulfill the TSA requirement in the Planning, Design, & Project Management 2 course.

## NOTES:

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## STUDENT HANDBOOK

Visit [mstc.edu/studenthandbook](http://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.

*Prerequisite: Accuplacer Math score of 65, Accuplacer Algebra score of 30, ABE Math Prep V 76854785 and ABE Math Prep VI 76854786 with a grade of "S." (Note: ABE Math Prep V and VI courses cannot be used to satisfy program completion requirements at Mid-State.)*

## SAMPLE FULL-TIME CURRICULUM OPTION

Term		18 credits
10442117	Welding Fundamentals 1 -or-	
10442118	Welding Fundamentals 2	1
10476171	Safety for Construction Trades ☑	1
10480101	Renewable Energy Overview	2
10482107	Construction Fundamentals	2
10483121	Piping Applications	3
10601110	HVAC Heating Fundamentals	2
10601130	Blueprint Reading for Construction Trades	2
10601140	Electricity for the Construction Trades	2
10804107	College Mathematics ☑	3
Term		16 credits
10483103	Electrical Components & Control Circuits	2
10483113	Hydronics and Heat Pumps	3
10483115	Energy Load Estimation and Modeling	3
10601120	HVAC Air Conditioning Fundamentals	2
10601121	Intro to HVAC Installation	2
10623106	Intro to AutoCAD	1
10801136	English Composition 1 ☑	3
Term		15 credits
10482104	Energy Storage Systems	3
10482110	Photovoltaic System Design & Installation	3
10482140	Planning, Design, & Project Management 1	3
10801196	Oral/Interpersonal Communication ☑ -or-	
10801198	Speech ☑	3
10809195	Economics ☑	3
Term		12 credits
10482106	Operations and Maintenance of PV Systems	3
10482141	Planning, Design, & Project Management 2	3
10809166	Intro to Ethics: Theory & Application ☑	3
10809188	Developmental Psychology ☑ -or-	
10809198	Intro to Psychology ☑	3
<b>Total credits 61</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		9 credits
10442117	Welding Fundamentals 1 -or-	
10442118	Welding Fundamentals 2	1
10476171	Safety for Construction Trades ☑	1
10480101	Renewable Energy Overview	2
10601140	Electricity for the Construction Trades	2
10804107	College Mathematics ☑	3
Term		8 credits
10483113	Hydronics and Heat Pumps	3
10601120	HVAC Air Conditioning Fundamentals	2
10801136	English Composition 1 ☑	3
Term		7 credit
10482107	Construction Fundamentals	2
10483121	Piping Applications	3
10601110	HVAC Heating Fundamentals	2
Term		8 credits
10483102	Electrical Components & Control Circuits	2
10483115	Energy Load Estimation and Modeling	3
10601121	Intro to HVAC Installation	2
10623106	Intro to AutoCAD	1
Term		8 credits
10482104	Energy Storage Systems	3
10482140	Planning, Design, & Project Management 1	3
10601130	Blueprint Reading for Construction Trades	2
Term		6 credits
10482110	Planning, Design, & Project Management 2	3
10809166	Intro to Ethics: Theory & Application ☑	3
Term		9 credits
10482110	Photovoltaic System Design & Installation	3
10801196	Oral/Interpersonal Communication ☑ -or-	
10801198	Speech ☑	3
10809195	Economics ☑	3
Term		6 credits
10482106	Operations and Maintenance of PV Systems	3
10809188	Developmental Psychology ☑ -or-	
10809198	Intro to Psychology ☑	3
<b>Total credits 61</b>		

# COURSE DESCRIPTIONS

## **Blueprint Reading for Construction Trades**

**10601130.....2 credits**

Develops the ability to read blueprints for commercial and non-commercial structures. Emphasizes blueprints drawn by licensed architects, covering plumbing, electrical wiring, structural framing, millwork, interior and exterior details, and basic information.

## **College Mathematics**

**10804107.....3 credits**

Designed to review and develop fundamental concepts of mathematics pertinent to the areas of: 1) arithmetic and algebra; 2) geometry and trigonometry; and 3) probability and statistics. Special emphasis is placed on problem solving, critical thinking and logical reasoning, making connections, and using calculators. Topics include performing arithmetic operations and simplifying algebraic expressions, solving linear equations and inequalities in one variable, solving proportions and incorporating percent applications, manipulating formulas, solving and graphing systems of linear equations and inequalities in two variables, finding areas and volumes of geometric figures, applying similar and congruent triangles, converting measurements within and between US and metric systems, applying Pythagorean Theorem, solving right and oblique triangles, calculating probabilities, organizing data and interpreting charts, calculating central and spread measures, and summarizing and analyzing data.

*Prerequisite: High School GPA of 3.0 or Accuplacer Arithmetic of 250 and QAS 234 or ACT of 17 or Pre-Algebra 10834109 with a grade of "C" or better or equivalent. Students are encouraged to bring transcripts for further evaluation if they do not meet these requirements.*

## **Construction Fundamentals**

**10482107.....2 credits**

Studies the concepts associated with the theory, materials, and methods used in construction, including footings and foundations, walls, floors, roofs and roof materials, exterior finishes, interior walls, ceiling and floor finishes, insulation types, vapor and air infiltration, and sound protection. Students also become familiar with blueprint reading and examine all trades associated with construction, including, electrical, HVAC, and plumbing. Safe use of the appropriate tools for each trade is covered.

## **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 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.*

## **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 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.*

## **Electrical Components & Control Circuits**

**10482103.....2 credits**

Topics include a review of AC/DC electricity fundamentals and the physical laws that apply to electronic circuits. Direct current (DC) covers basic definitions of voltage, current, and resistance and analysis of series and parallel resistive circuits. Alternating current (AC) includes an introduction to AC generation, capacitors, inductors, and transformers and their applications in electronic circuits. Additional topics include control circuits, symbols, diagrams, protection devices, relays, thermostats, single-phase motors, control components, and troubleshooting ACR system wiring diagrams.

*Prerequisite: Electrical Circuits I 10605105 or Electricity for the Construction Trades 10601140*

## **Electricity for the Construction Trades**

**10601140.....2 credits**

This course is an introduction to electrical theory and application for those in the construction and building trades. Content includes AC and DC circuits, schematics, Ohms law, multimeter use and circuit troubleshooting. This course will also provide an introduction to the contents of the National Electric Code (NEC).

## **Energy Load Estimation and Modeling**

**10483115.....3 credits**

In this course students will develop the skills to do residential and light commercial energy load estimations. Students will calculate heating and cooling building loads and estimate energy consumption rates and quantities. The student will also estimate energy upgrades such as insulation, window improvements, etc. and calculating payback and fuel savings. The course covers a variety of computer programs available for analyzing buildings.

## **Energy Storage Systems**

**10482104.....3 credits**

Students continue to develop their knowledge of photovoltaic systems by designing solar + storage systems for residential and small-commercial applications. The energy storage systems analyzed will include multiple battery technologies and system sizes. Students will plan the installation of a grid-connected energy storage system and an off-grid stationary or mobile system.

# COURSE DESCRIPTIONS

## English Composition 1 ☑

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

Designed for learners to develop knowledge and skills in all aspects of the writing process. Planning, organizing, writing, editing, and revising are applied through a variety of activities. Students analyze audience and purpose, use elements of research, and format documents using standard guidelines. Individuals develop critical reading skills through analysis of various written documents.

*Prerequisite: High School GPA of 3.0 or Accuplacer Writing of 262 or ACT of 20 or College Reading and Writing 1 10831104 with a "C" or better or equivalent. Students are encouraged to bring transcripts for further evaluation if they do not meet these requirements.*

## HVAC Air Conditioning Fundamentals

**10601120 .....2 credits**

Topics include air conditioning principles and terms, physical principles of air movement, air filtering and humidity, and methods of conditioning air for comfort and health. Also covers the proper use of psychrometers, dry bulb thermometers, hygrometers, and reading and interpretation of psychrometric charts and scales as well as ASHRAE and BPI ventilation standards for residential units. (HVAC is a common industry reference to heating, ventilation, and air conditioning.)

## HVAC Heating Fundamentals

**10601110 .....2 credits**

Provides an introduction to how homes and buildings are heated. Topics include introduction to heat principles, temperature measurement, fuels and other sources of heat, combustion, basic heating systems, basic furnace design, boiler design and operation, venting of furnaces, chimney or exhaust gases, and system controls. (HVAC is a common industry reference to heating, ventilation, and air conditioning.)

## Hydronics and Heat Pumps

**10483113 .....3 credits**

Addresses solar thermal, geothermal, and biomass heating systems. Students participate in the installation and design of a solar hot water system. Topics include safety; system design and layout; component selection; mounting collectors; installing and insulating copper tubing; and installing a storage tank, heat exchanger, circulation pump, and other system components.

## Intro 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 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 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 HVAC Installation

**10601121 .....2 credits**

Addresses residential and light commercial heating and cooling systems. Emphasizes the diversity of heating and cooling systems and how they operate. Students participate in the installation of a variety of HVAC systems and troubleshoot and service systems. (HVAC is a common industry reference to heating, ventilation, and air conditioning.)

## 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 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.*

## Operations and Maintenance of PV Systems

**10482106 .....3 credits**

Introduces basic principles and best practices for operating and maintaining PV systems. Students will analyze performance evaluation techniques and develop procedures for maintaining and troubleshooting photovoltaic systems. Students will use diagnostic tools such as an I-V curve tracer, Insulation resistance meter, pyranometers, thermal imagers, clamp-on meters, and digital multimeters while gaining hands-on experience with commercial, residential and solar + storage systems.

## 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 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.*

# COURSE DESCRIPTIONS

## Photovoltaic System Design & Installation

**10482110 .....3 credits**

Students learn the details involved in the mechanical and electrical integration of a photovoltaic (PV) system. Topics include system components, product specifications, product integration, racking system design capabilities and limits, system diagramming, configurations, safety, common design mistakes and solutions, and installation techniques. Involves students in the installation of a PV system.

## Piping Applications

**10483121.....3 credits**

Presents the fundamentals of plumbing and piping installation practices. Laboratory activities provide students with basic pipe joining processes associated with the plumbing and HVAC industries.

## Planning, Design, & Project Management 1

**10482140 .....3 credits**

Students in this capstone course design an integrated portfolio of energy systems, incorporating renewable energy options into a conventional system. Each learner writes a project proposal, works with project teams, sequences project tasks, develops project budgets, and identifies project resources.

## Planning, Design, & Project Management 2

**10482141 .....3 credits**

A continuation of Planning, Design, & Project Management I. Students create a capstone project that incorporates traditional and renewable energy systems with an overall goal of peak energy efficiency and energy production.

*Prerequisite: Planning, Design, & Project Management 1 10482140*

## Renewable Energy Overview

**10480101.....2 credits**

Investigates the need for renewable energy systems and emerging careers in renewable energy. Students examine the basic design, function, cost, and other considerations associated with solar photovoltaic, solar thermal, wind, geothermal and biomass renewable energy systems. Students also explore energy efficiency and conservation methods.

## Safety for Construction Trades ☑

**10476171.....1 credit**

The Safety for the Construction Trades course teaches construction related workers about their rights, employer responsibilities and how to identify, abate, avoid and prevent job related hazards. Students will familiarize themselves with the proper selection and use of personal protective equipment and safety requirements on a construction site for various activities. Course outcomes align with the training outcomes recommended by OSHA. Upon successful completion, students will receive an OSHA 10 Card.

## 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. Bring transcripts for further evaluation if they do not meet these requirements.

*Prerequisite: High School GPA of 3.0 or Accuplacer Reading of 253, Writing of 262, or ACT of 21 Reading/19 Writing, or completion of College Reading and Writing 1 10831104 with a "C" or better or equivalent.*

## Welding Fundamentals 1

**10442117 .....1 credit**

An introduction to fundamental welding techniques with an emphasis on safe work habits that covers the processes of FCAW, GMAW, and OXY-Fuel cutting. Classroom instruction paired with lab activities are designed to provide fundamental skills in each of the welding processes covered in the class.

## Welding Fundamentals 2

**10442118 .....1 credit**

An introduction to fundamental welding techniques with an emphasis on safe work habits that covers the processes of GTAW, SMAW and Plasma cutting. Classroom instruction paired with lab activities are designed to provide fundamental skills in each of the welding processes covered in the class.