

# renewable energy technician

## Associate in Applied Science (AAS) Program Code: 10-482-3 Total Credits: 60

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: \_\_\_\_\_  
\_\_\_\_\_

**mstc.edu**  
**888.575.6782**



**MID-STATE**  
TECHNICAL COLLEGE

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

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

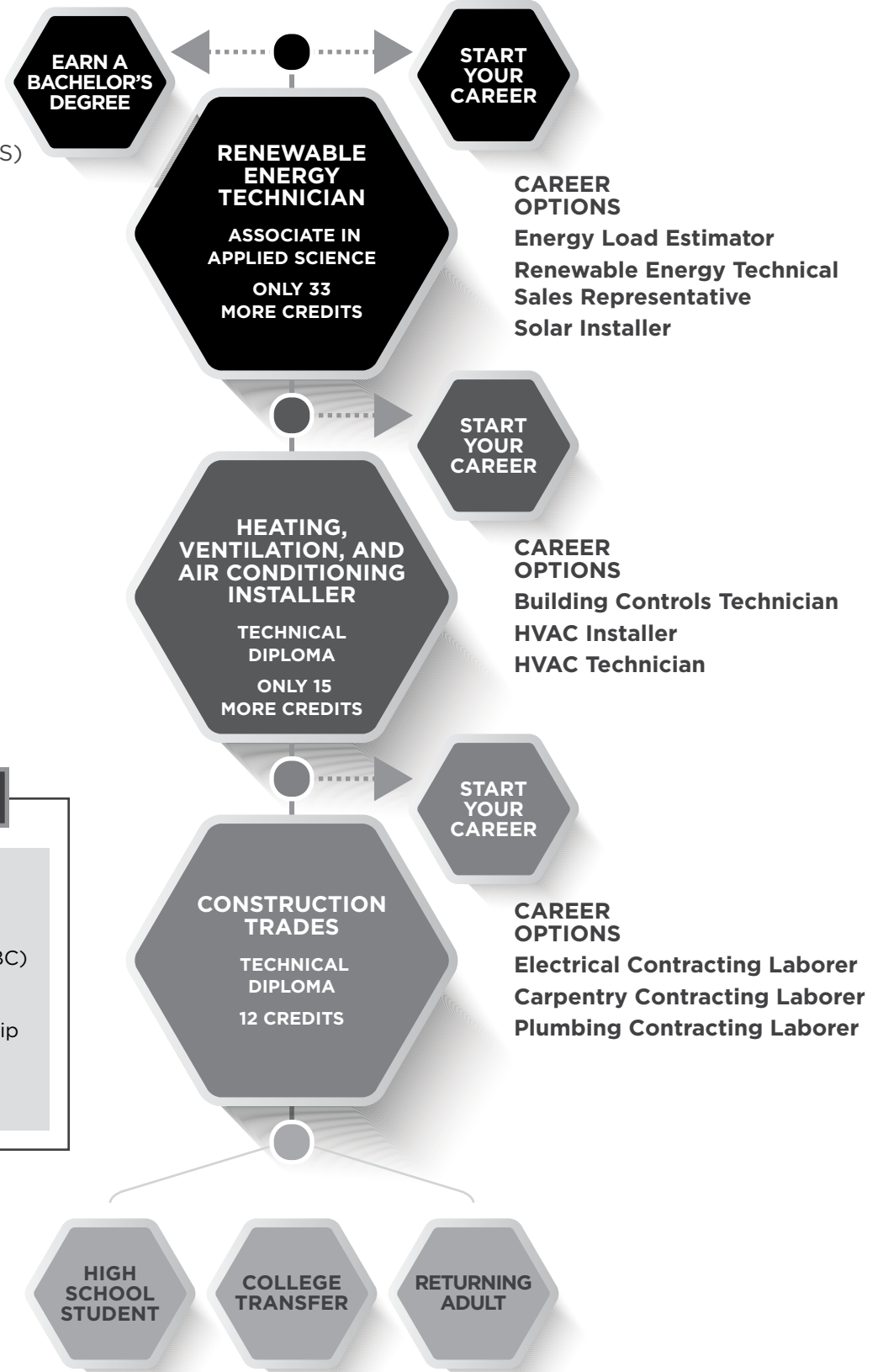
**STEVENS POINT CAMPUS**  
1001 Centerpoint Drive  
Stevens Point, WI 54481

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

**BACHELOR'S DEGREE OPTIONS**

UW-River Falls,  
Sustainable Management (BS)

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

College Credit • Dual Credit • Military Experience • Work Experience  
Learn about Credit for Prior Learning at [mstc.edu/cpl](http://mstc.edu/cpl).

**BEGIN AT ANY POINT  
IN THE PATHWAY**



## SAMPLE FULL-TIME CURRICULUM OPTION

Term		16 credits
10442117	Welding Fundamentals 1 -or-	
10442118	Welding Fundamentals 2	1
10476170	OSHA 30 for the Construction Trades	2
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

Term		16 credits
10482140	Planning, Design, & Project Management 1	3
10483110	Sustainable Heating System Design & Installation	3
10483115	Energy Load Estimation and Modeling	3
10483130	Electrical Controls & Systems for Buildings	3
10601120	HVAC Air Conditioning Fundamentals	2
10601121	Intro to HVAC Installation	2

Term		14 credits
10481110	Building Science and Evaluation	2
10482110	Photovoltaic System Design & Installation 1	3
10801136	English Composition 1	3
10801196	Oral/Interpersonal Communication -or-	
10801198	Speech	3
10804107	College Mathematics	3

Term		14 credits
10482111	Photovoltaic System Design & Installation 2	3
10482141	Planning, Design, & Project Management 2	3
10623106	Intro to AutoCAD	1
10623114	Intro to Inventor	1
10809166	Intro to Ethics: Theory & Application	3
10809188	Developmental Psychology -or-	
10809198	Intro to Psychology	3

**Total credits 60**

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/classfinder](http://mstc.edu/classfinder).

## SAMPLE PART-TIME CURRICULUM OPTION

Term		7 credits
10442117	Welding Fundamentals 1 -or-	
10442118	Welding Fundamentals 2	1
10476170	OSHA 30 for the Construction Trades	2
10480101	Renewable Energy Overview	2
10601140	Electricity for the Construction Trades	2

Term		8 credits
10482140	Planning, Design, & Project Management 1	3
10483110	Sustainable Heating System Design & Installation	3
10601120	HVAC Air Conditioning Fundamentals	2

Term		7 credit
10482107	Construction Fundamentals	2
10483121	Piping Applications	3
10601110	HVAC Heating Fundamentals	2

Term		8 credits
10483115	Energy Load Estimation and Modeling	3
10483130	Electrical Controls & Systems for Buildings	3
10601121	Intro to HVAC Installation	2

Term		7 credits
10481110	Building Science and Evaluation	2
10601130	Blueprint Reading for Construction Trades	2
10804107	College Mathematics	3

Term		7 credits
10482141	Planning, Design, & Project Management 2	3
10623106	Intro to AutoCAD	1
10809166	Intro to Ethics: Theory & Application	3

Term		9 credits
10482110	Photovoltaic System Design & Installation 1	3
10801136	English Composition 1	3
10801196	Oral/Interpersonal Communication -or-	
10801198	Speech	3

Term		7 credits
10482111	Photovoltaic System Design & Installation 2	3
10623114	Intro to Inventor	1
10809188	Developmental Psychology -or-	
10809198	Intro to Psychology	3

**Total credits 60**

## **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.

## **Building Science and Evaluation**

**10481110.....2 credits**

This course studies the interrelationship of a building, its occupants and the systems in the building. Topics include ventilation, moisture, renewable energy, sustainability, LEED design, and energy use in buildings. Students will learn the tools and techniques used in the analysis of building envelope integrity. Skills include blower door testing and how to use an infrared camera and other tools to detect insulation, air, and moisture problems in a building.

## **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 834109 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.*

## **Electrical Controls & Systems for Buildings**

**10483130.....3 credits**

Topics include an introduction to AC/DC electricity 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.

*Corequisite: Electrical Circuits I 10605105 or Intro to Electronics 10605108 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.

## **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 Intro to College Writing 10-831-103 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. Proficiency in word processing skills recommended.*

## **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.)

## **Intro 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.

## **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 Inventor**

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

This course is an introduction to Inventor by AutoDesk. Students will learn how to create 3D models of basic objects, add dimensioning, and generate multiview projections.  
*Corequisite: Intro to AutoCAD 10623106*

## **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.*

## **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.*

## **OSHA 30 for the Construction Trades**

**10476170 .....2 credits**

The Occupational Safety and Health Administration (OSHA) 30 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. Course outcomes align with the training outcomes recommended by OSHA. Upon successful completion, students will receive an OSHA 30 Card.

## **Photovoltaic System Design & Installation 1**

**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.

## **Photovoltaic System Design & Installation 2**

**10482111 .....3 credits**

This course is a continuation of Photovoltaic System Design and Installation 1 and will include an indepth focus of the electrical integration of a PV system. Topics include: system design capabilities and limits, system diagramming, wiring configurations, safety, National Electrical Code, common design mistakes and solutions, wiring techniques and installation techniques. System maintenance principles and commissioning will also be covered.

*Prerequisite: Photovoltaic System Design and Installation 1 10482110*

## 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.

## 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 Intro to College Writing and/or Intro to College Reading with a "C" or better or equivalent. Students are encouraged to bring transcripts for further evaluation if they do not meet these requirements.*

## Sustainable Heating System Design & Installation

**10483110 .....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.

## 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.