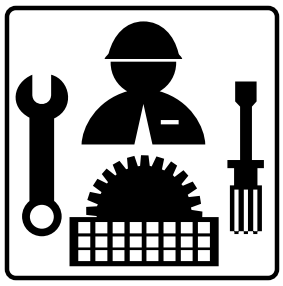

RENEWABLE ENERGY TECHNICIAN

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

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

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**.

TECHNICAL DIPLOMA

CONSTRUCTION TRADES

Technical Diploma • 10 Credits

Start Your Career

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

HEATING, VENTILATION, & AIR CONDITIONING (HVAC) INSTALLER

Technical Diploma • 24 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) • 60 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 Maryland Global, University of Phoenix, UW-Green Bay, UW-Oshkosh, 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**.

OTHER OPTIONS

APPRENTICESHIP OPPORTUNITIES

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

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 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:

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		17 credits
10476171	Safety for Construction Trades ✎	1
10480101	Renewable Energy Overview	2
10482107	Construction Fundamentals	2
10483123	Piping Installation	2
10601110	HVAC Heating Fundamentals	2
10601130	Blueprint Reading for Construction Trades	2
10601140	Electricity for the Construction Trades	2
10804107	College Mathematics ✎	3
31442320	Welding Foundations 1 **-or-**	
31442321	Welding Foundations 2	1

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
10801198	Speech ✎ **-or-**	
10801196	Oral/Interpersonal Communication ✎	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
10809198	Intro to Psychology ✎ **-or-**	
10809188	Developmental Psychology ✎	3

Total credits 60

✎ 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		9 credits
10476171	Safety for Construction Trades ✎	1
10480101	Renewable Energy Overview	2
10601140	Electricity for the Construction Trades	2
10804107	College Mathematics ✎	3
31442320	Welding Foundations 1 **-or-**	
31442321	Welding Foundations 2	1

Term		8 credits
10483113	Hydronics and Heat Pumps	3
10601120	HVAC Air Conditioning Fundamentals	2
10801136	English Composition 1 ✎	3

Term		6 credit
10482107	Construction Fundamentals	2
10483123	Piping Installation	2
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
10801198	Speech ✎ **-or-**	
10801196	Oral/Interpersonal Communication ✎	3
10809195	Economics ✎	3

Term		6 credits
10482106	Operations and Maintenance of PV Systems	3
10809198	Intro to Psychology ✎ **-or-**	
10809188	Developmental Psychology ✎	3

Total credits 60

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

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
This course is designed to review and develop fundamental concepts of mathematics in the areas of algebra, geometry, trigonometry, measurement and data. Algebra topics emphasize simplifying algebraic expressions, solving linear equations and inequalities with one variable, solving proportions and percent applications. Geometry and trigonometry topics include; finding areas and volumes of geometric figures, applying similar and congruent triangles, applying Pythagorean Theorem, and solving right triangles using trigonometric ratios. Measurement topics emphasize the application of measurement concepts and conversion techniques within and between U.S. customary and metric system to solve problems. Data topics emphasize data organization and summarization skills, including: frequency distributions, central tendency, relative position and measures of dispersion. Special emphasis is placed on problem solving, critical thinking and logical reasoning, making connections, and using calculators.
Prerequisite: High School GPA of 2.6 and MMM_1 or Accuplacer Arithmetic of 250 and QAS 234 or ACT Math score of 17 or Pre-Algebra 10834109 with a "C" or better

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 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

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
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

HVAC Air Conditioning Fundamentals
10601120 .....2 credits
Topics include air conditioning principles and terms, the refrigeration vapor and compression cycle, refrigerants and oils, and methods of conditioning air for comfort and health. Also covers the proper use of refrigeration gauges, dry bulb thermometers, hygrometers, and reading and interpretation of psychrometric charts and scales as well as EPA 608 refrigerant handling standards.

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
Students participate in the installation and design of a hydronic hot water and heat pump system. Topics include safety; system design and layout; component selection; mounting hydronic heat sources; installing distribution tubing; and installing heat emitters, air separator, circulation pumps, 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 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 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 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English

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 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English

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 Installation
10483123.....2 credits
This course introduces students to the fundamentals of measuring, fitting, joining, and installing piping common to 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. 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

Welding Foundations 1
31442320.....1 credit
An introductory welding course focusing on FCAW, GMAW and oxy-fuel cutting. Lecture and lab activities are designed to emphasize safe work habits.

Welding Foundations 2
31442321.....1 credit
An introductory welding course focusing on GTAW, SMAW and plasma cutting processes. Lecture and lab activities are designed to emphasize safe work habits.