

RENEWABLE THERMAL ENERGY TECHNICIAN



Program Code 10-483-1

Estimated Program Costs: \$12,000

Median Annual Salary: \$25,000

OVERVIEW

The Renewable Thermal Energy Technician program will prepare technicians who design, install, operate, and maintain solar, geothermal, and biomass heating systems for both residential and commercial applications.

Technicians will perform site assessments and integrate new renewable thermal systems with current existing energy sources. Renewable thermal energy technician may be involved in the sale or marketing of solar, geothermal, and biomass thermal energy technologies.

The Renewable Thermal Energy Technician program is offered at the Wisconsin Rapids campus.

PROGRAM OUTCOMES

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

- Work safely with renewable thermal systems
- Install solar thermal collectors
- Install geothermal heat pumps
- Install biomass boilers
- Install water heater and storage tanks
- Install piping, pipe insulation, and connect system piping
- Install balance of system components
- Install electrical control systems
- Perform a system checkout and inspection
- Maintain and troubleshoot a renewable thermal system
- Select a system design
- Adapt a system design
- Conduct a site assessment

CAREER OPTIONS

Controls Technician
Geothermal Installation, Maintenance,
and Repair Technician
Geothermal Sales Representative
Heat Load Estimator
Pre-Apprentice/Laborer
Production Assistant
Service Technician
Solar Site Assessor
Solar Thermal Installation, Maintenance,
and Repair Technician
Solar Thermal Sales Representative

POTENTIAL FOR ADVANCEMENT

Energy Analyst
Journeyman: Plumber, Steamfitter
Master Technician
Project Development Engineers
Project Manager
System Designer

Potential advancement generally requires further education.

ADMISSIONS PROCEDURES

To apply to the Renewable Thermal Energy Technician program, please submit the following documents to the MSTC Admissions Office:

1. Complete an MSTC application form and return it with the \$30 non-refundable application fee.

2. Complete the Accuplacer or ACT test. Minimum scores required:

- Reading-Accuplacer score of 55
- Sentence Skills-Accuplacer score of 60
- Math-Accuplacer score of 34
- ACT equivalents for above scores are acceptable.

You may take the Accuplacer again if you did not meet the required scores. Additional options, including coursework and tutoring, are also available to assist you. Contact the Student Affairs Office on your local campus to learn about your options. To schedule an Accuplacer test, contact your local Campus Office.

Written Communication, courses in mathematics, and some science courses have placement requirements. Please refer to the course description section in the back of the catalog, listed under General Education, for course specific information.

3. Submit an official copy of all academic transcripts, including high school, college or university, and HSED/GED.

**Mid-State Technical College
Admissions
500 32nd Street North
Wisconsin Rapids, WI 54494**

PROGRAM COURSE DESCRIPTIONS

10001148 // 3 credits

People, Resources, and Sustainability

This course explores the relationship between the human population and natural resources over time, and the effect this relationship has on the biosphere. Global resources, environmental concerns, and the human dimensions of resource management are explored from biological and socioeconomic perspectives.

10103106 // 3 credits

Microsoft Office-Introduction

Develops introductory skills in the Microsoft Office Suite (Word, Excel, Access, and PowerPoint) while reinforcing the students' knowledge of computer concepts, file management, Internet, and MSTC student email usage through demonstrations and lab exercises. Students must possess basic keyboarding, mouse, and Windows skills. Students may develop these skills in Academic Success Center computer training prior to enrolling or while concurrently enrolled in the Microsoft Office-Introduction course.

10103124 // 1 credit

Excel-Intermediate

Develop skill to write and debug macros, create custom menus, perform database functions, and develop graphs.

Prerequisite: Microsoft Office-Introduction 10103106 or Excel-Beginning 10103123

10480100 // 2 credits

Alternative Energy Overview

In this course, students will investigate the need for renewable energy systems and emerging careers in renewable energy. Students will examine the basic design, function, cost, and other considerations associated with various "green" energy systems, including solar photovoltaic, solar thermal, wind, geothermal, and biomass. Students will also explore the production and use of alternative transportation fuels.

10480190 // 2 credits

Renewable Energy Internship

Student internships provide an opportunity for career success through supervised on-the-job learning experiences.

Through an internship, students will apply subject knowledge learned in the program to the workplace under the direction of an experienced technician.

Prerequisite: Completion of 50% of program credits

10480195 // 2 credits

Renewable Energy/Energy Conservation-Special Topics

Selected hands-on project in renewable energy/energy conservation requiring students to apply subject knowledge learned in the program.

Prerequisite: Completion of 50% of program credits

10481100 // 2 credits

Intro to Energy Efficiency & Management

Students in this course will be introduced to the principles of energy management and the energy efficiency industry. Students will learn about the history of energy production and costs, and the dynamics of worldwide energy consumption and growth including environmental and financial impacts and consequences. Building energy flows will be described and analyzed. Students will be introduced to the use of building diagnostic tools commonly employed in the industry to identify opportunities for improving energy efficiency. Building design features will be examined for efficiency/management improvements or upgrades.

Prerequisite: Admission to Energy Efficiency Technician 10481, Renewable Electricity Technician 104822, Renewable Energy Specialist 104823, or Renewable Thermal Energy Technician 10483 programs

CURRICULUM

		(17 credits)
Term		
10103106	Microsoft Office-Introduction	3
10480100	Alternative Energy Overview	2
10482107	Construction Fundamentals	2
10483100	Intro to Renewable Thermal Systems	3
10483120	Heating & Plumbing Systems	2
10623106	Intro to AutoCAD	2
10804107	College Mathematics	3

		(17-18 credits)
Term		
10103124	Excel-Intermediate	1
10483101	Solar Water Heating Site Assessor Training	2
10483110	Solar Water Heating System Installation I	2
10483121	Piping Fundamentals	2
10483122	Ventilation & Cooling Systems	2
10605105	Electrical Circuits I	3
-or-		
10605108	Intro to Electronics	2
10801195	Written Communication	3
10801196	Oral/Interpersonal Communication	3
10801198	Speech	3

		(2 credits)
Term		
10480190	Renewable Energy Internship	2
10480195	Renewable Energy/Energy Conservation-Special Topics	2

		(16 credits)
Term		
10001148	People, Resources, and Sustainability	3
10481100	Intro to Energy Efficiency & Management	2
10483111	Solar Water Heating System Installation II	2
10483151	Geothermal Systems	3
10809143	Microeconomics	3
10809144	Macroeconomics	3
10809198	Intro to Psychology	3

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RENEWABLE THERMAL ENERGY TECHNICIAN

CURRICULUM

Continued from the previous page

Term	(16 credits)
10483112	Solar Water Heating System Installation III 2
10483115	Heat Load Estimation 2
10483130	Electrical Controls & Systems 3
10483161	Advanced Renewable Thermal Systems 3
10809122	Intro to American Government 3
10809196	Intro to Sociology 3

Total Credits 68-69

Please Note:

- The Renewable Thermal Energy Technician program has an August start date. We advise you to meet with an academic advisor or counselor to successfully plan your academic schedule.
- This curriculum sequence is only for student planning. Actual student schedules will vary depending on course availability.
- Degree completion time may vary based on student scheduling and course availability.
- For General Education course descriptions (800 level), see section marked under Course Descriptions.

10482107 // 2 credits

Construction Fundamentals

Students will study the concepts associated with the theory, materials, and methods used in construction to include 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. Additionally, students will become familiar with blueprint reading and examine all the trades associated with construction including electrical, HVAC, and plumbing. The safe use of the appropriate tools for each trade will also be covered.

Prerequisite: Admission to Energy Efficiency Technician 10481, Renewable Electricity Technician 104822, Renewable Energy Specialist 104823, or Renewable Thermal Energy Technician 10483 programs

10483100 // 3 credits

Intro to Renewable Thermal Systems

This course provides an overview of a variety of renewable/alternative water and space heating systems including solar, geothermal, and biomass. This overview will include an introduction to system design, installation, and operation.

Prerequisite: Admission to Energy Efficiency Technician 10481, Renewable Electricity Technician 104822, Renewable Energy Specialist 104823, or Renewable Thermal Energy Technician 10483 programs

10483101 // 2 credits

Solar Water Heating Site Assessor Training

Students will learn how to assess a facility for its potential for a solar hot water system. Students will learn how to define a site's solar window, interpret solar radiation and temperature data, size a system, identify mounting and engineering considerations relevant to the installation, identify and recommend steps for energy efficiency, perform a load analysis, describe and identify components of a solar water heating system, perform a general cost estimate for a solar water heating installation, list installers and equipment vendors, and provide information on financial programs in Wisconsin.

Corequisite: Intro to Renewable Thermal Systems 10483100

10483110 // 2 credits

Solar Water Heating System Installation I

This course will involve students in the installation of a solar hot water system. Topics include safety; system design and layout; component selection; mounting collectors; plumbing and insulating copper pipe; and installing a storage tank, heat exchanger, circulation pump, and other system components.

Prerequisite: Intro to Renewable Thermal Systems 10483100

10483111 // 2 credits

Solar Water Heating System Installation II

This course is a continuation of Solar Water Heating System Installation I and will focus on system integration. It will also address solar space heating installation and design.

Prerequisite: Solar Water Heating System Installation I 10483110

10483112 // 2 credits

Solar Water Heating System Installation III

This course is a continuation of Solar Water Heating System Installation II and will involve students as the lead installer in a solar water heating system installation.

Prerequisite: Solar Water Heating System Installation II 10483111

10483115 // 2 credits

Heat Load Estimation

This course will teach the student how to use "Manual J" from ACCA. The student will develop the skills to do residential heating and cooling heat loads. Students will calculate heat loss and also losses or gains due to infiltration, sun loads, etc. The student will do calculations on actual buildings using ACCA industry standard form J-1. The student will also estimate energy upgrades such as insulation, and window improvements, and calculate payback and fuel savings.

Prerequisite: College Mathematics 10804107

Corequisite: Heating & Plumbing Systems 10483120 or Ventilation & Cooling Systems 10483122

10483120 // 2 credits**Heating & Plumbing Systems**

Heating system topics include introduction to heat principles, temperature measurement, fuels, and other sources of heat, combustion, basic heating systems, basic furnace design, gas furnace design and operation, venting of furnaces, chimney or exhaust gases, and system controls. Plumbing system topics include fluid dynamics (pressure, resistance, and flow), basic system design, water heating, and operation of standard plumbing fixtures.

Prerequisite: Admission to Energy Efficiency Technician 10481, Renewable Electricity Technician 104822, Renewable Energy Specialist 104823, or Renewable Thermal Energy Technician 10483 programs

10483121 // 2 credits**Piping Fundamentals**

This course will present the theory of basic methods of plumbing and piping installation practices. Laboratory activities will provide students with basic pipe joining processes associated with the plumbing field.

Prerequisite: Intro to Renewable Thermal Systems 10483100

10483122 // 2 credits**Ventilation & Cooling Systems**

Topics covered include air conditioning principles and terms, physical principles of air movement, air filtering and humidity, and methods of conditioning air for comfort and health. In addition, the proper use of psychrometers, dry bulb thermometers, hygrometers, and the reading and interpretation of psychrometric charts and scales are covered, along with ASHRAE and BPI ventilation standards for residential units. Descriptions of new products and maintenance and operations for residential and commercial cooling systems are also covered, emphasizing energy conservation and efficiency options for new and existing equipment.

10483130 // 3 credits**Electrical Controls & Systems**

Topics in this course 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.

Prerequisite: Electrical Circuits I 10605105 or Intro to Electronics 10605108

10483151 // 3 credits**Geothermal Systems**

This course provides an overview of geothermal water and space heating/cooling systems. This overview will include an introduction to system design, installation, and operation.

Prerequisites: Intro to Renewable Thermal Systems 10483100, Ventilation & Cooling Systems 10483122, and College Mathematics 10804107

10483161 // 3 credits**Advanced Renewable Thermal Systems**

This course provides an overview of a variety of biomass-fueled water and space heating systems. This overview will include an introduction to system design, installation, and operation.

Prerequisite: Successful completion of 12 credits of Renewable Thermal Energy 10483 coursework.

10605108 // 2 credits**Intro to Electronics**

This course presents a survey of electricity and electronics which includes lab activities and is designed for persons wishing to learn some of the basics of electricity and electronics. It is an excellent refresher course to get back into electronics or improve a skills list. The course is intended for persons where electronics has become a part of their regular occupation and a need exists to identify various electronic components and perform basic tests using test equipment such as multimeters and oscilloscopes. The course covers concepts and applications of DC and AC electricity, semiconductor components, and digital devices using basic math skills.

10623106 // 2 credits**Intro to AutoCAD**

This is an introductory course in computer aided drafting (CAD) using AutoCAD software. It will provide 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 are recommended.