

# electrical power engineering technician

## Associate in Applied Science (AAS)

**Program Code: 10-605-5**

**Total Credits: 61**

Unique in the Wisconsin Technical College System, Mid-State's Electrical Power Engineering Technician program prepares graduates to maintain vital energy systems that harness fossil, hydro, and nuclear energy sources. You'll learn the principles of high-voltage energy transmission and how to analyze instrument readings. You'll also learn how to locate equipment, design wiring layouts, route new power lines, specify materials, troubleshoot equipment and systems, and much more. You'll gain hands-on experience operating a bucket truck and take field trips to electrical power generation facilities, dispatch centers, substations, and motor repair facilities.

**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

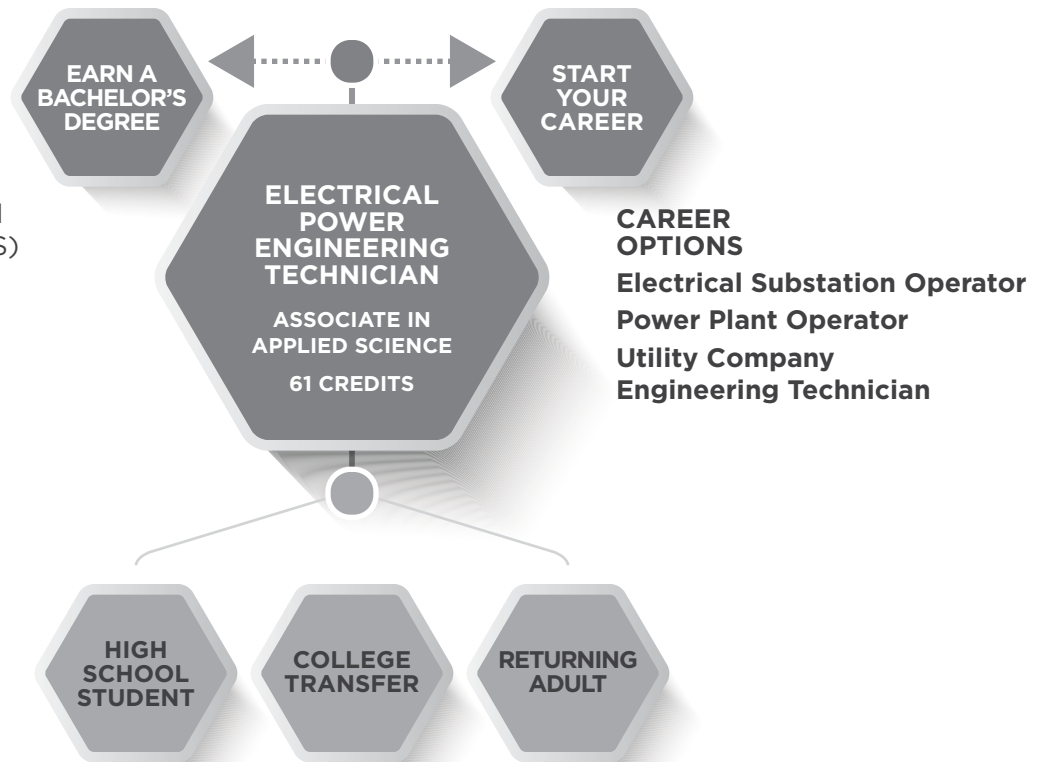
**STEVENS POINT CAMPUS**  
1001 Centerpoint Drive  
Stevens Point, WI 54481

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

## BACHELOR'S DEGREE OPTIONS

UW-Oshkosh,  
Organizational Studies  
emphasis of Leadership and  
Organizational Studies (BAS)

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



**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**

## OTHER OPTIONS

### RELATED PROGRAMS

- Civil Engineering Technology-Highway Technician
- Industrial Automation & Controls Engineering Technology

### APPRENTICESHIP OPPORTUNITIES

- Metering Technician Apprenticeship



## SAMPLE FULL-TIME CURRICULUM OPTION

<b>Term</b>		<b>16 credits</b>
10103123	Excel-Beginning	1
10605105	Electrical Circuits I	3
10605120	Electrical Power Science	3
10623106	Intro to AutoCAD	1
10623115	Intro to Engineering	1
10801136	English Composition 1	3
10804118	Intermediate Algebra with Applications	4
<b>Term</b>		<b>15 credits</b>
10605110	Electrical Circuits II	3
10605115	Semiconductor Technology	3
10605122	Electrical Power Generation	3
10801196	Oral/Interpersonal Communication <b>-or-</b>	
10801198	Speech	3
10804196	Trigonometry with Applications	3
<b>Term</b>		<b>15 credits</b>
10605117	Automation 1 - Beginning PLC	3
10605125	Electrical Power Distribution	3
10605127	Electrical Machines	3
10804195	College Algebra with Applications	3
10806143	College Physics 1	3
<b>Term</b>		<b>15 credits</b>
10605124	Electrical Power Transmission	3
10605170	Electrical Power System Protective Relaying	3
10809122	Intro to American Government <b>-or-</b>	
10809166	Intro to Ethics: Theory & Application	3
10809188	Developmental Psychology <b>-or-</b>	
10809198	Intro to Psychology	3
	Elective	3
<b>Total credits</b>		<b>61</b>

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

<b>Term</b>		<b>8 credits</b>
10605105	Electrical Circuits I	3
10623115	Intro to Engineering	1
10804118	Intermediate Algebra with Applications	4
<b>Term</b>		<b>7 credits</b>
10103123	Excel-Beginning	1
10605110	Electrical Circuits II	3
10804196	Trigonometry with Applications	3
<b>Term</b>		<b>7 credits</b>
10605120	Electrical Power Science	3
10623106	Intro to AutoCAD	1
10801136	English Composition 1	3
<b>Term</b>		<b>9 credits</b>
10605115	Semiconductor Technology	3
10605122	Electrical Power Generation	3
10801196	Oral/Interpersonal Communication <b>-or-</b>	
10801198	Speech	3
<b>Term</b>		<b>9 credits</b>
10605117	Automation 1 - Beginning PLC	3
10605125	Electrical Power Distribution	3
10804195	College Algebra with Applications	3
<b>Term</b>		<b>9 credits</b>
10605170	Electrical Power System Protective Relaying	3
10809122	Intro to American Government <b>-or-</b>	
10809166	Intro to Ethics: Theory & Application	3
	Elective	3
<b>Term</b>		<b>6 credits</b>
10605127	Electrical Machines	3
10806143	College Physics 1	3
<b>Term</b>		<b>6 credits</b>
10605124	Electrical Power Transmission	3
10809188	Developmental Psychology <b>-or-</b>	
10809198	Intro to Psychology	3
<b>Total credits</b>		<b>61</b>

# course descriptions

## Automation 1 - Beginning PLC

**10605117 .....3 credits**

An overview of programmable logic controllers (PLCs) that provides a foundation of knowledge of the programming techniques, operation, and maintenance of PLCs used in typical industrial automation.

## College Algebra with Applications

**10804195 .....3 credits**

Covers the skills needed for success in calculus and many application areas on a baccalaureate level. Topics include the real and complex number systems, polynomials, exponents, radicals, solving equations and inequalities (linear and nonlinear), relations and functions, systems of equations and inequalities (linear and nonlinear), matrices, graphing, conic sections, sequences and series, combinatorics, and the binomial theorem.

*Prerequisite: Trigonometry with Applications 10804196 with a grade of "C" or better or Intermediate Algebra with Applications 10804118 with a grade of "C" or better. Students without Trigonometry with Applications are encouraged to bring transcripts for individual course evaluation.*

## College Physics 1

**10806143 .....3 credits**

Presents the applications and theory of basic physics principles. This course emphasizes problem solving, laboratory investigation and applications. Topics include laboratory safety, unit conversions and analysis, kinematics, dynamics, work, energy, power, temperature and heat.

*Corequisite: Trigonometry with Applications 10804196*

## 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 Circuits I

**10605105 .....3 credits**

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. Approximately 50 percent of the course is spent in the laboratory applying the principles and theory presented in the classroom.

*Corequisite: Intermediate Algebra with Applications 10804118*

## Electrical Circuits II

**10605110 .....3 credits**

Continues the study of AC/DC circuits started in Electrical Circuits I. Introduces advanced DC circuit analysis techniques such as Thevenin's Theorem and nodal analysis. Includes discussion of voltage and power theorems used in the analysis of AC circuits consisting of both resistance and reactance. The complex plane and construction of phasor diagrams are also discussed. Concludes with an introduction to electronic filter circuits used in transmission and communication equipment. Approximately 50 percent of the course is spent in the laboratory, applying the principles and theory presented in the classroom.

*Prerequisite: Electrical Circuits I 10605105 with a "C" or better; Corequisite: Trigonometry with Applications 10804196*

## Electrical Machines

**10605127 .....3 credits**

Teaches the fundamentals of generators and motors. Covers DC and AC generators and motors.

*Prerequisite: Electrical Circuits I 10605105*

## Electrical Power Distribution

**10605125.....3 credits**

Designed to teach the principles of distribution systems and substations. Covers wire capacity, sag, guying, supporting structures, troubleshooting, insulators, lightning arresters, switches, and recloser and power circuit breakers. Students apply distribution standards of an actual utility to the building and design of a power line on paper.

*Prerequisites: Electrical Circuits I 10605105 and Electrical Power Generation 10605122*

## Electrical Power Generation

**10605122.....3 credits**

A study of equipment and facilities used in the production of electricity. Topics include fuels, prime mover turbines, and generators. Emphasizes safety controls, efficient production, and operational procedures. Concludes with computer-simulated operation of a large power station boiler. It is recommended that students take Electrical Power Science 10605120 prior to taking this course.

## Electrical Power Science

**10605120 .....3 credits**

An introduction to the field of electrical power technology. Covers the power generation process, transmission techniques, and networks. Topics include prime energy sources, converting raw energy into electrical energy, metering electricity, and disbursing electrical energy from generation plant to consumer.

## Electrical Power System Protective Relaying

**10605170 .....3 credits**

A study of controlling devices and systems utilized in generation, distribution, and transmission of electricity. Students study instrument transformers, protective relays, protective systems, power system standards, drawing conventions, equipment rating terminology, insulation, circuit interrupting devices, grounding, and power system faults.

*Prerequisite: Electrical Machines 10605127*

## Electrical Power Transmission

**10605124 .....3 credits**

Covers the basic principles of high-voltage transmission of electrical energy. Introduces students to the concepts of active, reactive, and apparent power in electric power technology. Discusses basic properties of single- and three-phase transformers and their importance to power transmission. The behavior of ideal and practical (or non-ideal) transformers are used as a building block to explain the electrical function of a transformer in many transmission circuits. Discusses basic mechanical (supporting structures, line sag, galloping and the effect of weather) and electrical (e.g., corona, pollution, insulation, lightning) requirements that must be met for successful power transmission over large distances. Approximately 50 percent of the course is spent in the laboratory working with equipment that simulates power transmission.

*Prerequisites: Electrical Machines 10605127 and Electrical Power Distribution 10605125*

## 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.*

## Excel-Beginning

**10103123..... 1 credit**

Students learn to create, modify, and format spreadsheets, charts, and graphics. Students also learn to perform calculations and analysis on data.

## Intermediate Algebra with Applications

**10804118 ..... 4 credits**

This course offers algebra content with applications. Topics include properties of real numbers; order of operations; algebraic solution for linear equations and inequalities; operations with polynomial and rational expressions; operations with rational exponents and radicals; and algebra of inverse, logarithmic, and exponential functions.

*Prerequisite: High School GPA of 3.0 or Accuplacer Arithmetic of 263 and QAS 234 or ACT of 19 or QAS of 245, 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.*

## Intro to American Government

**10809122.....3 credits**

Introduces American political processes and institutions. Focuses on rights and responsibilities of citizens and the process of participatory democracy. Learners examine the complexity of the separation of powers and checks and balances. Explores the role of the media, interest groups, political parties, and public opinion in the political process. Also explores the role of state and national government in our federal system.

*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 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 Engineering

**10623115..... 1 credit**

This introductory course in engineering focuses on engineering concepts of analysis through resolution of dimensions in problem solving, life cycle cost, and logic/reasoning.

*Corequisite: Intermediate Algebra w/Apps 10804118 or consent of instructor*

## 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 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.*

## **Semiconductor Technology**

**10605115 .....3 credits**

Presents semi-conductor principles with emphasis on practical applications. After reviewing diode and transistor characteristics, studies bias stabilizing techniques followed by an introduction to transistor amplifiers.

*Corequisite: Electrical Circuits II 10605110*

## **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.*

## **Trigonometry with Applications**

**10804196 .....3 credits**

Topics include circular functions, graphing of trigonometry functions, identities, equations, trigonometric functions of angles, inverse functions, solutions of triangles, complex numbers, DeMoivre's Theorem, polar coordinates, and vectors.

*Prerequisite: Intermediate Algebra with Applications 10804118 with a grade of "C" or better. Students without Intermediate Algebra with Applications are encouraged to bring transcripts for individual course evaluation.*