

Electrical Power Engineering Technician

Associate in Applied Science Degree (AAS)

Overview

Electrical power engineering is critical to maintaining the infrastructure and health of the nation. Students review fossil, hydro and nuclear energy sources that supply energy to prime movers and generators. Prime movers are commonly combustion, steam or hydroelectric turbines. You will learn the principles of high voltage energy transmission and how to analyze instrument readings. You will learn how to determine the location of equipment and design wiring layouts and determine the routing of

new power lines and specify materials. You will also learn about wire capacity and sag, guying, support structures, insulators, lightning arresters, switches, circuit breakers and troubleshooting procedures. Plant loads, lighting, above and below ground systems, transformers, grounding practices, relaying and protection will also be covered.

The Electrical Power Engineering Technician program is offered at the Wisconsin Rapids campus.



Career Options

- Construction Electrician
- Distribution Estimator
- Electrical Lineperson
- Engineering Technician
- First Class Meter Person
- Instrument Technician
- Nuclear Equipment Attendant
- Power Plant Operator
- Research Lab Technician
- Transmission Design Technician

Potential for Advancement

- Designer
- District Manager
- Electrical Maintenance Supervisor
- Engineer Assistant

Potential advancement generally requires further education.

Admissions Procedures

To apply to the Electrical Power Engineering Technician program, please submit the following to MSTC Student Affairs Admissions Office:

1. WTCS application form and \$30 non-refundable application fee
2. Completed Accuplacer test. (Other test scores may be acceptable alternatives.) Entrance exam requirements for the Electrical Power Engineering Technician program are:
 - Reading-Accuplacer score of 55 or equivalent
 - Language-Accuplacer score of 60 or equivalent
 - Math-Accuplacer score of 65 or equivalent

If a student does not meet the required scores in these academic areas, they may remediate and retest or complete an identified structured remediation course(s) in the Academic Support Center. Please see course descriptions for specific math requirements.

3. High school transcript or GED/HSED scores

Mid-State Technical College
Admissions
500 32nd Street North
Wisconsin Rapids, WI 54494
mstc.edu
888.575.MSTC

Program Course Descriptions

10468100

Alternative Energy Overview 2 credits

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.

10605105

Electrical Circuits I 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% of the course is spent in the laboratory applying the principles and theory presented in the classroom. Corequisite: College Tech Math 1A 10804113

Program Outcomes

Employers will expect you, as an Electrical Power Engineering Technician graduate, to be able to:

- Demonstrate safe work practices around electrical power systems whether self-directed or operating as part of a team
- Interpret and comply with relevant codes, regulations and standards
- Identify various electrical power sources and differentiate operational characteristics
- Describe and assess operation of integrated electrical power delivery system
- Apply power measurement, monitoring and recording techniques and explain output

**10605110
Electrical Circuits II 3 credits**

This course continues the study of AC/DC circuits started in Electrical Circuits I. Advanced DC circuit analysis techniques such as Thevenin's Theorem and Node analysis are introduced. AC circuit analysis includes discussion on voltage and power theorems used in the analysis of circuits consisting of both resistance and reactance. The complex plane and construction of phase diagrams are also discussed. The course concludes with an introduction to electronic filter circuits used in transmission and communication equipment. Approximately 50% of the course is spent in the laboratory, applying the principles and theory presented in the classroom. Prerequisite: Electrical Circuits I 10605105 grade "C" or better; Corequisite: College Tech Math 1B 10804114

**10605115
Basic Electronics 3 credits**

Presents semi-conductor principles with emphasis on practical applications. After reviewing diode and transistor characteristics, bias stabilizing techniques are studied followed by an introduction to transistor amplifiers. Corequisite: Electrical Circuits II 10605110

**10605117
Programmable Logic
Controllers-Beginning 3 credits**

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

**10605120
Electrical Power Science 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.

**10605122
Electrical Power Generation 4 credits**

A study of equipment and facilities utilized in the production of electricity. Topics include fuels, prime mover turbines and generators. Emphasis is on safety controls, efficient production and operational procedures. The course concludes with computer-simulated operation of a large power station boiler. Prerequisite: Admission to Electrical Power Engineering Technician Program 106055

**10605124
Electrical Power Transmission 3 credits**

This course covers the basic principles of high-voltage transmission of electrical energy. Students are introduced to the concepts of active, reactive and apparent power in electric power technology. Basic properties of single and three phase transformers and their importance to power transmission are discussed. 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. Basic mechanical (supporting structures, line sag, galloping and the effect of weather) and electrical (like corona, pollution, insulation and lightning) requirements that must be met for successful power transmission over large distances are discussed. Approximately 50% of the course is spent in the laboratory working with equipment that simulates power transmission. Prerequisite: Electrical Machines 10605127

**10605125
Electrical Power Distribution 4 credits**

Designed to teach the principles of distribution systems and substations. Covers wire capacity, sag, guying, supporting structures, troubleshooting, insulators, lightning arresters, switches, recloser and power circuit breakers. Students also do an exercise applying distribution standards of an actual utility to the building and design of a power line on paper. Prerequisite: Electrical Circuits I 10605105

**10605127
Electrical Machines 3 credits**

Designed to teach fundamentals of generators and motors. Covers DC and AC generators and motors. Prerequisite: Electrical Circuits I 10605105

**10605170
Instrumentation & Control Devices 4 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

**10606105
Intro to AutoCAD 2 credits**

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. Prior knowledge of drafting techniques is recommended.

Curriculum

First Semester (17 Credits)

10605105	Electrical Circuits I	3
10605120	Electrical Power Science	3
10606105	Intro to AutoCAD	2
10801195	Written Communication	3
10804113	College Technical Mathematics 1A	3
10809143	Microeconomics	3
	or	
10809144	Macroeconomics	3

Second Semester (18 Credits)

10605110	Electrical Circuits II	3
10605115	Basic Electronics	3
10605122	Electrical Power Generation	4
10801196	Oral/Interpersonal Communication	3
	or	
10801198	Speech	3
10804114	College Technical Mathematics 1B	2
10806143	College Physics 1	3

Third Semester (17 Credits)

10605117	Programmable Logic Controllers- Beginning	3
10605125	Electrical Power Distribution	4
10605127	Electrical Machines	3
10804116	College Technical Mathematics 2	4
10806144	College Physics 2	3

Fourth Semester (16 Credits)

10468100	Alternative Energy Overview	2
10605124	Electrical Power Transmission	3
10605170	Instrumentation & Control Devices	4
10809198	Intro to Psychology Elective	3
		4

Total Credits 68

Please Note:

- The Electrical Power Engineering Technician program has an August starting date. However, we advise you to meet with a counselor to successfully plan your academic schedule.
- For General Education course descriptions (800 level courses), see section marked under Course Descriptions.