ELECTRONICS

Program Code 10-605-1
Expected Program Costs: $11,200
Median Annual Salary: $29,000

OVERVIEW

The field of electronics continues to expand and the need for skilled technicians remains strong. This program will train you for jobs in troubleshooting and repair of electronic equipment in the manufacturing, communications and service industries.

Learn about the design, development, manufacturing and servicing of electronic equipment and gain a basic understanding of digital electronics and computers. You will receive a broad electronics background and be prepared for a wide variety of jobs in the electronics field.

The Electronics program is offered at the Wisconsin Rapids campus.

PROGRAM OUTCOMES

Employers will expect you, as an Electronics graduate, to be able to:

- Use appropriate industry established symbols, standards and terminology to interpret electrical schematics and drawings
- Select and comply with relevant industry established safety standards
- Employ appropriate mathematical formulas to solve electronic problems
- Solve problems working alone or in a team environment
- Assess system problems and take appropriate action

CAREER OPTIONS

Communications Equipment Service and Repair
Electronics Installation and Maintenance Technician
Electronics Instrumentation Technician
Electronics Service Technician
Electronics Troubleshooter
Industrial Controls Systems Technician
Microprocessor/Computer Lab Technician
Research Lab Assistant
Sales/Service Technician
Systems Specialist

POTENTIAL FOR ADVANCEMENT

Control Systems Design Engineer
Control Systems Sales and Management
Control Systems Start-Up Engineer
Control Systems Supervisor
Control Systems Technician
Journeyperson: Instrument Technician, Electrician
Planning and Scheduling Coordinator
Plant Maintenance Supervisor

Potential advancement generally requires further education.

ADMISSIONS PROCEDURES

To apply to the Electronics 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 65
   - ACT equivalents for above scores are acceptable.

   If a student does not meet the required test scores, they may retest or complete an identified structured course(s) in the Academic Support Center.
   - 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

10103106 // 3 credits
Microsoft Office-Introduction
Develops introductory skills in the Microsoft Office Suite (Word, Excel, Access, PowerPoint, and Outlook) while reinforcing the students' knowledge of computer concepts, Windows Explorer and Internet usage through demonstrations and lab exercises. Students should possess basic keyboarding, mouse and Windows XP skills. Students may develop these skills in Academic Support Center computer training prior to enrolling or while concurrently enrolled in the Microsoft Office-Introduction course.

10605105 // 3 credits
Electrical Circuits I
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: Intermediate Algebra w/ Apps 10804118

10605107 // 3 credits
Microprocessors
Introduces students to the basic operation of microprocessors. Begins with an introduction to the basic concepts of architecture and programming. Covers various types of instructions required to perform operations that are basic to microprocessors. Concludes with more advanced programming techniques, interfacing and microprocessor hardware.
Corequisite: Digital Integrated Circuits 10605151

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.

10605110 // 3 credits
Electrical Circuits II
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: Trigonometry w/Apps 10804196

CURRICULUM

Term		(17 credits)
10103106	Microsoft Office-Introduction	3
10605105	Electrical Circuits I	3
10605108	Intro to Electronics	2
10605117	Programmable Logic Controllers-Beginning	3
10623106	Intro to AutoCAD	2
10804118	Intermediate Algebra with Applications	4

Term		(18 credits)
10605110	Electrical Circuits II	3
10605115	Basic Electronics	3
10605151	Digital Integrated Circuits	3
10801195	Written Communication	3
10804196	Trigonometry with Applications	3
10809143	Microeconomics **-or-**	
10809144	Macroeconomics	3

Term		(17 credits)
10605107	Microprocessors	3
10605150	Linear Circuitry	3
10605160	Computer Systems	3
10605164	Electronics Fabrication 1	1
10804195	College Algebra with Applications	3
10806154	General Physics 1	4

Term		(16 credits)
10605152	Control Circuits & Systems	3
10605161	Computer Systems Design	3
10605162	Input-Output Devices & Storage	3
10605165	Electronics Fabrication 2	1
10801196	Oral/Interpersonal Communication **-or-**	
10801198	Speech	3
10809198	Intro to Psychology	3

Total Credits 68

Please Note:
- The Electronics 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.

10605115 // 3 credits
Basic Electronics
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 // 3 credits
Programmable Logic Controllers-Beginning
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.

10605150 // 3 credits
Linear Circuitry
Continues the study of semi-conductors including the frequency effects in multi-stage amplifiers. Operational amplifiers theory and the effects of negative feedback on operational amplifiers will be studied. The application of operational amplifiers in various linear and non-linear circuits will also be discussed. Regulated power supplies, oscillators, and timers are analyzed. Frequency mixing and signal modulation will be studied after an introduction to the frequency domain.
Prerequisite: Basic Electronics 10605115-Grade "C" or better

10605151 // 3 credits
Digital Integrated Circuits
The logical theory and application of digital integrated circuits are studied with regard to individual chip functions and their interconnections to build digital circuits. Techniques used in the analysis of digital ICs include number systems, Boolean algebra, and Karnaugh mapping techniques. Student experimentation will utilize standard industrial integrated circuit families to reinforce the analysis and techniques of circuit operation.
Corequisite: Basic Electronics 10605115

10605152 // 3 credits
Control Circuits & Systems
Provides knowledge of basic automatic control systems used in industry. Includes such systems as power and motor control, photoelectric devices, servomechanisms and operation amplifier applications. The student will be introduced to basic industrial closed loop system control including on/off, proportional, PI and PID modes. Emphasis is on hands-on applications of the above principles. Basic SCR applications involving AC inverter and DC phase controlled motor drives are discussed and applied using "real world" equipment in the laboratory. Industrial safety is stressed throughout the course.
Prerequisite: Digital Integrated Circuits 10605151; Corequisite: Microprocessors 10605107

10605160 // 3 credits
Computer Systems
This course is designed to teach the basic operations of a computer. The course will emphasize the electronic components used in computers with an emphasis on the processor. The fundamental relationships between components will be presented to form a strong foundation in computer hardware. In addition to formal lecture periods a laboratory period will be utilized to give "hands-on" time so the student can analyze actual computer components, circuits, and assemblies. Computer usage during lab periods will give the student experience with computers.
Corequisite: Digital Integrated Circuits 10605151

10605161 // 3 credits
Computer Systems Design
The course will train the student to start with a basic computer system and expand its operating capabilities. Units will cover basic system devices using standard industrial integrated circuits. Processor and memory timing will be examined to explain the basic operating theory of computer systems. Various memory technologies will be studied to determine appropriate memory expansion procedures. The DMA Direct Memory Access Integrated Circuit will also be studied as an example of peripheral to memory data transfers. The course will give ample "hands-on" time in the laboratory for circuit construction and evaluation. Troubleshooting procedures will be examined as each unit is developed.
Prerequisite: Computer Systems 10605160

10605162 // 3 credits
Input-Output Devices & Storage
Deals with specific peripheral devices encountered in all computer systems regardless of the system type or application. Emphasis will be placed on the theory of computer interfacing, and on various troubleshooting methods used in computer maintenance. Performance evaluation will be studied using diagnostic routines when possible. Testing methods will be explained and used including the use of machine code routines. The purpose of this type of approach is to give the student substantial "hands-on" experience in all major input/output hardware areas.
Prerequisite: Computer Systems 10605160

10605164 // 1 credit
Electronics Fabrication 1
This course provides hand-on activity in the design and construction of electronic equipment. Topics include but are not limited to circuit design, schematics, printed circuit board layout and fabrication. The course includes projects designed to apply your knowledge of electrical theory to real-world applications.
Prerequisite: Intro to AutoCAD 10623106; Corequisite: Basic Electronics 10605115

10605165 // 1 credit
Electronics Fabrication 2
This course is a continuation of Electronics Fabrication 1 in which you will assemble, test and troubleshoot your electronics projects. Topics include but are not limited to surface mount technology, soldering techniques, and troubleshooting. A formal presentation and demonstration of a working project is expected.
Prerequisite: Electronics Fabrication 1 10605164

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 is recommended.