

Associate Degree - Two Years

Offered at the Green Bay campus. For information: (920) 498-5444.

Toll-free: (800) 422-NWTC, ext. 5444.

Program Description

Electrical Engineering Technology (EET) prepares students to test, maintain, and troubleshoot electrical and electronic devices as found in machinery, computers, and communications. The program consists of two tracks: a transfer track, which includes calculus, for those students planning to transfer to a four-year EET program, and a general track, for those students not planning to transfer. The EET transfer track graduate will be able to transfer to a four-year bachelor's degree program in Electrical Engineering Technology.

Program Outcomes

- Adhere to workplace safety standards.
- Communicate using common technical terminology and graphic symbology.
- Write a technical document.
- Develop an industry acceptable team centered work ethic.
- Use office suite software package tools.
- Solve problems using algebra, trig, complex numbers, logarithms, exponentials, and calculus.
- Relate mathematics to the field of electricity and electronics.
- Interpret graphical data.
- Measure electrical parameters in DC and wideband AC circuits.
- Apply circuit theorems to AC/DC RLC circuits.
- Apply Boolean theorems to basic digital circuits.
- Describe transfer characteristics of frequency sensitive linear circuits.
- Manipulate formulas describing electrical/electronic phenomena.
- Predict operation of circuits containing active components.
- Describe the various digital modulation techniques.
- Identify characteristics of power electrical devices and circuits.
- Describe the assembly and interconnections of a microprocessor system.
- Use computer assembly language to program microprocessors and interface circuits.
- Operate microprocessor interface circuits.
- Describe wireless analog communication techniques.
- Analyze automatic electrical machine control circuits.
- Use tools for electrical/electronic test and assembly tasks.

Employment Potential

A graduate of this program will have the potential for employment in the following areas:

Electrical/Electronic Development Technician:

assists engineers in the design and development of experimental and prototype equipment and products.

Electrical/Electronic Maintenance Technician:

services and programs in-plant automatic control equipment, computers, robots, and other equipment.

Electrical Test Technician: tests, troubleshoots, and inspects electrical/electronics products (quality control testing).

Electrical/Electronics Technician: maintains equipment including motor controllers, cables, communication equipment, computers, security systems, CNC equipment, programmable controllers, robots, and automatic production equipment; works with engineers in building breadboard and prototype devices; and evaluates and tests electronic devices and systems.

Field Service Technician: services and overhauls equipment in the customer's facility; works with sales personnel; and demonstrates new equipment to potential customers.

With the additional education and/or work experience, graduates may find other opportunities for employment.

- Computer Field Service Supervisor
- Electrical/Electronics Production Superintendent
- Electrical/Electronics Maintenance Supervisor
- Field Service Engineer
- Electrical Engineer

Requirements for Program Entry

- Completed application.
- High school transcript or equivalent (such as an HSED or GED® Transcript).
- NWTC Academic Skills Assessment or equivalent (See Academic Skills Assessment section for details and equivalents).
- Beginning with applications submitted for Fall 2008, students will be required to take the Accuplacer College Level Math assessment instead of the Algebra assessment. The benchmark grade for Electrical Engineering Technology on the College Math assessment is 63.
- To complete the program in a minimum of two years, students must have satisfied or completed Intermediate Algebra with Applications, 10-804-118, before entering the first semester of the program. This is equivalent to two years of High School Algebra and one year of High School Geometry. Intermediate Algebra with Applications, 10-804-118, is a prerequisite for the first semester courses DC 2: Circuits, 10-660-105; and Trigonometry with Applications, 10-804-196.
- Other beginning courses require mastery of algebra skills. For a description of algebra skills, see the Basic Education section of this catalog.

Please Note:

- Some courses have prerequisites (listed at the end of each course description, if applicable) that need to be taken prior to enrolling in those courses.
- Many courses are offered via our Flexible Learning Options (online, accelerated, ITV, video, weekend, and self-paced) and may be taken in any order as long as prerequisites are met. To find out which program courses are offered through Flexible Learning Options, go to www.nwtc.edu or consult a counselor, (920) 498-5444.
- Descriptions of courses not found on this page can be found in the back of this catalog.

Curriculum

The Electrical Engineering Technology Associate Degree is a two-year, four-semester program consisting of two tracks. Students take one of the two. Upon graduation, a student will have completed 70 credits.

First Semester All Students Must Complete

Catalog No.	Description	Credits
10-620-140	Machine Wiring and Safety	1
10-660-101	Digital 1: Logic	1
10-660-102	Digital 2: Sequential	1
10-660-103	Digital 3: Registers	1
10-660-104	DC 1: Introduction	1
10-660-105	DC 2: Circuits	1
10-660-106	DC 3: Circuit Theorems	1
10-801-195	Written Communication	3
10-804-196	Trigonometry w Apps	3
10-809-195	Economics	3
Total Credits		16

Second Semester All Students Must Complete

Catalog No.	Description	Credits
10-660-107	AC 1: Properties	1
10-660-108	AC 2: Reactance	1
10-660-109	AC 3: RLC Circuits	1
10-660-110	Electronics 1: Diodes-Basic	1
10-660-111	Electronics 2: Trans-Basic	1
10-660-112	Electronics 3: Op-Amps-Basic	1
10-660-113	Digital 4: ALU	1
10-660-114	Digital 5: Characteristics	1
10-660-115	Digital 6: Systems	1
10-801-197	Technical Reporting	3
10-804-195	College Algebra w Apps	3
Total Credits		15

Third Semester All Students Must Complete

Catalog No.	Description	Credits
10-605-160	Linear Electronics 1: BJT Amps	1
10-605-161	Linear Electronics 2: JFET Amp	1
10-605-162	Linear Electronics 3: Filters	1
10-605-163	Micro 1: Introduction	1
10-605-164	Micro 2: Technique	1
10-605-165	Micro 3: Interfaces	1
10-605-170	Datacomm 1: Introduction	1
10-605-171	Datacomm 2: Pulse Code Mod	1
10-605-172	Datacomm 3: Delta Modulation	1
10-662-112	DC/AC 3	3
10-809-172	Race Ethnic & Diversity	3
Total Credits		15

Fourth Semester All Students Must Complete

Catalog No.	Description	Credits
10-605-166	Micro 4: Advanced Interfacing	1
10-605-167	Micro 5: Intermediate	1
10-605-180	Analog Comm 1: Noise Effects	1
10-605-181	Analog Comm 2: AM/SSB	1
10-605-182	Analog Comm 3: FM Systems	1
10-620-161	Power Electricity 1: Motors	1
10-620-162	Power Electricity 2: Motors	1
10-662-124	Electronic Circuit Analysis	3
10-809-198	Intro to Psychology	3
Total Credits		13

General Track**Second Semester**

Catalog No.	Description	Credits
	Elective	3
Total Credits		3

Third Semester

10-806-143	College Physics 1	3
	Elective	1
Total Credits		4

Fourth Semester

10-605-168	Micro 6: Advanced	1
10-620-159	Power Electronics 3: Drives	1
	Elective	2
Total Credits		4

Transfer Track**Second Semester**

Catalog No.	Description	Credits
10-806-143	College Physics 1	3
Total Credits		3

Third Semester

10-804-198	Calculus 1	4
Total Credits		4

Fourth Semester

10-804-181	Calculus 2	4
Total Credits		4

Suggested Electives:

Machine Tool Processes 1, 10-420-171
 Machine Tool Processes 2, 10-420-172
 Machine Fabrication 1, 10-442-150
 Machine Fabrication 2, 10-442-151
 Mechanics 2: Intermediate, 10-620-122
 Mechanics 3: Systems, 10-620-123
 Fluids 3: Intermediate Hy, 10-620-165
 Rigging Systems 1, 10-620-105
 Rigging Systems 2, 10-620-106

Course Descriptions

These courses provide an opportunity for students to develop the knowledge, skills, and understanding required for employment in this field.

10-605-160 LINEAR ELECTRONICS 1: BJT

AMPLIFIERS ...review the characteristics of the bipolar junction transistor and Class A, Class AB and Class B bipolar junction transistor amplifiers.

10-605-161 LINEAR ELECTRONICS 2: JFET

AMPLIFIERS ...characteristics of the junction field-effect (JFET) transistor amplifier and types of commonly used field effect transistor amplifiers. (Prerequisite: 10-605-160, Linear Electronics 1)

10-605-162 LINEAR ELECTRONICS 3:

PASSIVE/ACTIVE FILTERS ...review the characteristics of the passive RL, RC, RLC active filters, introduction to all types of commonly used passive and active filters. (Prerequisite: 10-605-161, Linear Electronics 2: JFET Amps)

10-605-163 MICROPROCESSORS 1:

INTRODUCTION ...review of number, use of simulation software, fetch and execute, and fundamentals of assembly language programming.

10-605-164 MICROPROCESSORS 2: TECHNIQUE

...complex addressing modes, fields in programming, pseudo-ops, programming technique, and continued use of simulation software. (Prerequisite: 10-605-163, Micro 1: Intro)

10-605-165 MICROPROCESSORS 3: INTERFACES

...basic assembly language programming for operating a SCI, ADC, Timer and SPI, and continued use of simulation software. (Prerequisite: 10-605-164, Micro 2: Technique)

10-605-166 MICROPROCESSORS 4: ADVANCED

INTERFACING ...writing rituals for switches, LEDs, LCDs, ADCs, keypads, stepper motors, DC motors, and infrared LEDs and the continued use of simulation software. (Prerequisite: 10-605-165, Micro 3: Interfaces)

10-605-167 MICROPROCESSORS 5: INTERMEDIATE

...designing and writing intermediate level programs in assembly language. The study will include the use of simulation software. (Prerequisite: 10-605-166, Micro 4: Advanced Interfacing)

This program is fully eligible for financial aid.

Electrical Engineering Technology course descriptions continue on next page ...

continued

10-605-168 MICROPROCESSORS 6: ADVANCED
...designing and write assembly language programs that implement Finite State Machines, interrupts, divide routines, and the continued use of simulation software. (Prerequisite: 10-605-167, Micro 5: Intermediate)

10-605-170 DATACOMM 1: INTRODUCTION
...introduction to pulse amplitude modulation, pulse amplitude modulation principles, sampling and signal reconstruction, and two-channel time division multiplexing. (Prerequisite: 10-660-103, Digital 3: Registers)

10-605-171 DATACOMM 2: PULSE CODE MODULATION ...introduction to pulse code modulation, pulse code modulation principles, sampling and signal reconstruction, analog to digital conversion, and digital to analog conversion. (Prerequisite: 10-605-170, Data Comm 1: Introduction)

10-605-172 DATACOMM 3: DELTA MODULATION
...introduction to delta modulation, delta modulation principles, sampling and signal reconstruction, and two-channel time division multiplexing. (Prerequisite: 10-605-171, Data Comm 2: Pulse Code)

10-605-180 ANALOG COMMUNICATIONS 1: NOISE EFFECTS ...characteristics of noise in communications systems and analyze amplitude modulation.

10-605-181 ANALOG COMMUNICATIONS 2: AM/SSB
...characteristics of single sideband transmission and receiving systems. (Prerequisite: 10-605-180, Analog Comm 1: Noise Effects)

10-605-182 ANALOG COMMUNICATIONS 3: FM SYSTEMS ...characteristics of frequency modulation transmission and receiving systems. (Prerequisite: 10-605-181, Analog Comm 2: AM/SSB)

10-620-140 MACHINE WIRING AND SAFETY
...introduction to machine wiring, including basic documentation, labeling, and wiring practices; and an overview of NFPA 70 - machinery, safety and installation standards.

10-620-159 POWER ELECTRONICS 3: DRIVES
...power circuitry of AC drives and application of an industrial AC drives to AC motors. (Corequisite: 10-620-161, Power Electricity 1: Motors)

10-620-161 POWER ELECTRICITY 1: MOTORS ...DC motors and generator configuration, shunt, compound, and permanent magnet DC motor performance and characteristics.

10-620-162 POWER ELECTRICITY 2: MOTORS
...series DC, Compound DC, AC Induction, and Specialty machine performance and characteristics, and three-phase power systems. (Prerequisite: 10-620-161, Power Electricity 1: Motors)

10-660-101 DIGITAL 1: LOGIC ...AND, OR, NOT, NAND, NOR, logic operation using switch logic, ladder logic, and gate logic. Simplification methods using Boolean theorems and Karnaugh Maps, and timing diagram analysis.

10-660-102 DIGITAL 2: SEQUENTIAL ...operation and connection of Latches, RS flip-flops, JK flip-flops, and D flip-flops using timing diagram analysis, and some simple applications are studied. (Prerequisite: 10-660-101, Digital 1: Logic)

10-660-103 DIGITAL 3: REGISTERS ...analyze and design asynchronous up counters, down counters, presettable counters, ring counters, and Johnson counters, and analyze synchronous counters. Analyze and design various types of shift registers. (Prerequisite: 10-660-102, Digital 2: Sequential)

10-660-104 DC 1: INTRODUCTION ...introduction to the concepts of DC electricity and simple series circuits. Voltage, Current, Resistance, Ohm's Law, Power and Kirchoff's Voltage Law are defined.

10-660-105 DC 2: CIRCUITS ...analysis of parallel and series-parallel circuits. Application of Kirchoff's Current Law to parallel circuit combinations. Introduction of current sources and source conversions. (Prerequisites: 10-804-118, Interm Algebra w Apps or equivalent; 10-660-104, DC 1: Intro)

10-660-106 DC 3: CIRCUIT THEOREMS ...analysis of circuits using various advanced methods. Branch, loop and node methods are studied. Eight network theorems are presented for the solution of circuit voltages and circuits. (Prerequisite: 10-660-105, DC 2: Circuits)

10-660-107 AC 1: PROPERTIES ...introduction to the properties of Capacitors and Inductors including types and behavior in switching circuits. Inductor basics include a study of magnetic fields. (Prerequisite: 10-660-105, DC 2: Circuits; Corequisite: 10-804-196, Trigonometry w Apps)

10-660-108 AC 2: REACTANCE ...study of the way inductive, capacitive and resistive components behave in a circuit excited by a sine waveform. Effective and average values of the sinewave are derived. (Prerequisite: 10-660-107, AC 1: Properties)

10-660-109 AC 3: RLC CIRCUITS ...power flow in complex AC circuits based on resistive and reactive components. Description of the power triangle and power factor. Calculation of voltages and currents in complex AC circuits. (Prerequisite: 10-660-108, AC 2: Reactance)

10-660-110 ELECTRONICS 1: DIODES-BASIC
...introduction to the characteristics and usage of semiconductor diodes in rectifiers and linear power supplies. Special diodes and diode circuits are also considered. (Prerequisite: 10-660-105, DC 2: Circuits; Corequisite: 10-660-107, AC 1: Properties)

10-660-111 ELECTRONICS 2: TRANSISTOR-BASIC
...introduction to the characteristics, bias and usage of semiconductor transistors in amplifying circuitry. BJTs, JFETs, MOSFETs and general amplifier characteristics are studied. (Prerequisite: 10-660-110, Electronics 1: Diodes-Basic)

10-660-112 ELECTRONICS 3: OP-AMPS-BASIC
...introduction to the circuit characteristics of integrated operational amplifiers. The various connections, inverting, non-inverting and comparator will be studied as well as specialized applications such as summers and filters. (Prerequisite: 10-660-111, Electronics 2: Transistor-Basic)

10-660-113 DIGITAL 4: ALU ...unsigned and signed arithmetic using binary numbers, the construction of adder circuits and subtraction circuits, and the analysis of a computer ALU is studied. (Prerequisite: 10-660-103, Digital 3: Registers)

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10-660-114 DIGITAL 5: CHARACTERISTICS

...propagation delay, rise time, fall time, setup and hold time, asynchronous timing considerations, Schmitt trigger devices, one-shots and astable multivibrators, and synchronous counter design are studied.
(Prerequisite: 10-660-113, Digital 4: ALU)

10-660-115 DIGITAL 6: SYSTEMS

...interconnection of ALU, registers, memory, decoders, control and sequence logic, glue-logic, clock and I/O into a working system is studied in block and circuit form. (Prerequisite: 10-660-114, Digital 5: Characteristics)

10-662-112 DC/AC 3 ...apply Thevenins and Nortons Theorems in practical problems involving complex AC circuits. Solve complex AC circuits using Mesh and Nodal techniques and describe power flow in complex AC circuits.
(Prerequisite: 10-660-109, AC 3: RLC Circuits)

10-662-124 ELECTRONIC CIRCUIT ANALYSIS

...develop equations for and analyze transistor amplifier circuits for bias, small signal gain, and transfer function including frequency response using Bode plot graphs of first order functions. (Prerequisite: 10-605-162 Linear Electronics 3: Filters)

10-804-181 CALCULUS 2 ...continuation Calculus I. Topics: integration techniques, indeterminate forms, improper integrals, techniques of integration, applications to the physical sciences, first order linear differential equations, Infinite series including Maclaurin, Taylor, and Fourier.
(Prerequisites: Recommendation: Completion of 10-804-198, Calculus 1 with a "C" or better)

10-806-143 COLLEGE PHYSICS 1 ...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.