

Electrical Engineering Technology

Associate in Applied Science Degree

Applied Engineering Technologies Program Cluster

Center for Agriscience & Technologies

Program offered at Madison Campuses

For information call: (608) 246-6800 or
(800) 322-6282 Ext. 6800

About the Program

The electronics industry offers many opportunities with high salaries and steady advancement for people with strong mathematics and analytical skills. This program offers an opportunity to develop abilities in a practical, hands-on curriculum. Employer demand for people who can analyze problems and implement solutions is always high. Computers, cellular phones, wireless services and other fields of electronics continue to expand.

This program offers excellent opportunities for articulation into four-year colleges and universities. A graduate of this program can articulate as a junior into the Milwaukee School of Engineering Bachelor of Science Electrical Engineering Technology program. Partial articulation can be arranged to the UW System with the assistance of a program advisor. COMPASS test is required for enrollment.

Unique Requirements for Admission:

Students must earn a grade of C or better in high school courses Algebra 1, Algebra 2, Chemistry and Physics. (Equivalent courses will be considered.)

The Electrical Engineering Technology Program participates in MAAP (Mandatory Assessment, Advising and Placement). This requires new students to complete the COMPASS test. Advisement and course placement in English and mathematics is done based on test results. Applicants can receive advanced standing for Applied Electronics Math 1 by scoring a 46 on the College Algebra section of the COMPASS test. Advanced placement for Applied Electronics Math 2 can be obtained by scoring a 46 in the Trigonometry section of the COMPASS test. Study guides, review material and sample questions for the COMPASS test are available online at matcmadison.edu (look for COMPASS in the "A-Z Index"). Applicants are advised to view this material prior to taking the test. Calculus AP may be applicable after consultation with a program advisor.

Curriculum

FIRST YEAR

First Semester		Credits	Hrs/week Lec-Lab
10-605-112	AC-DC Electronics 1	3	2-3
10-605-113	Analog Solid-State Devices 1	3	2-3
10-605-118	Digital Electronics 1	3	2-3
10-801-195	Written Communication	3	3-0
10-809-199	Psychology of Human Relations	3	3-0
Semester Total		15	

Second Semester

10-605-114	AC-DC Electronics 2	3	2-3
10-605-119	Digital Electronics 2	3	2-3
10-605-173	Embedded Programming	3	2-3
10-801-197	Technical Reporting	3	3-0
10-804-196	Trigonometry with Applications OR	3	3-0
20-804-213	Trigonometry	(3)	(2-2)
10-809-195	Economics	3	3-0
Semester Total		18	

SECOND YEAR

First Semester

10-605-115	Analog Solid State Devices 2	3	2-4
10-605-131	Technical Calculus 1*	4	3-2
10-605-176	Microcontrollers	3	2-3
10-662-112	AC/DC 3	3	2-3
10-806-143	College Physics 1	3	2-2
Semester Total		16	

Second Semester

10-605-143	Motors and Control Circuits	3	2-3
10-605-132	Technical Calculus 2*	4	3-2
10-605-150	Electronic Data Transmission	3	2-3
10-662-124	Circuit Analysis	3	2-3
20-809-203	Intro to Sociology	3	3-0
Semester Total		16	

*Alternate Math Selections

20-804-231	Calculus & Analytic Geometry 1	5 credits
20-804-232	Calculus & Analytic Geometry 2	5 credits
20-804-233	Calculus & Analytic Geometry 3	5 credits

*In place of Technical Calculus 1 and 2, students who intend to transfer into the UW System should substitute Calculus & Analytic Geometry 1,2,& 3. When selecting this alternative, all three Calculus and Analytic Geometry courses are required for EET degree completion.

For all other alternatives, approval of an Electronics Department advisor is required. Students should also contact the receiving college or university about transferring credits as soon as they develop their course plans. Courses from the Liberal Studies Program-College Transfer Option (800-series) can be used in lieu of required courses.

Note: Students are assessed for correct placement in English or mathematics courses based on their scores on the COMPASS test or on completion of the appropriate prerequisite(s). Additionally, there may be courses in other subject areas that may use COMPASS scores as prerequisites when reading, writing, math, or critical thinking competencies are required.

Program Courses

10-605-112 AC-DC Electronics 1 3 credits

Course covers basic concepts of electric circuits including: Ohm's Law; Kirchhoff's Voltage and Current Laws; power calculations; and components such as resistors, switches, fuses, conductors, insulators, capacitors, inductors, relays, and other basic electronic components. Also covers use of digital multimeters (DMM); phase relationships; use of oscilloscopes on AC waveforms. Prerequisite: satisfactory mathematics placement score on COMPASS test.

10-605-113 Analog Solid State Devices 1 3 credits

Introductory electronic course covering devices, circuits and applications. Uses analog electronics devices — diodes, (rectifier, zener, LED), field effect and bipolar transistors and operational amplifiers to learn basic theory and use of test equipment (DMM, oscilloscope, function generators) in testing and troubleshooting. Lab procedures emphasize use of documentation (schematics, layout diagrams, parts lists, data sheets) and troubleshooting procedures.

10-605-114 AC-DC Electronics 2 (transfer) 3 credits

Continuation of 10-605-112. Covers RL, RC, RLC circuits; transformers; filters; series and parallel resonance; bridge circuits; Thevenin and Norton theorems; wave shaping; internal resistance; motors; generators; three phase power; power factor and corrections; reactive and apparent power; wye and delta systems. A formal lab reporting required. Prerequisite: 10-605-112 and satisfactory mathematics placement score on COMPASS test.

10-605-115 Analog Solid State Devices 2 3 credits

Continuation of 10-605-113. Covers theory and application of field effect and bipolar transistor amplifiers, oscillators and operational amplifiers. Emphasis on circuits including gain, impedance and frequency response. Lab procedures emphasize increased proficiency with electronic test equipment. Prerequisites: 10-605-113 and 10-605-114.

10-605-118 Digital Electronics 1 3 credits

Course covers schematic digital component identification, PCB component identification, Engineering Notation, Basic Gates, IC Numbering Systems, Through hole and surface mount footprint identification, IPC-610-D Hole Through and Surface Mount (SMT) soldering and rework training, Lead Free RoHS soldering and rework training, IPC-610-D and RoHS rework criteria, dual source de-soldering training, surface mount fine pitch drag soldering training, and electronic assembly training.

10-605-119 Digital Electronics 2 3 credits

Course covers digital logic circuits including basic gates, flip-flops, decoders, counters, shift registers, multiplexing circuits, comparators and other similar devices. It also covers Boolean algebra and Karnaugh map minimization techniques and Field Programmable Gate Arrays (FPGA). Lab work includes individual project design, layout, construction, testing and documentation. Prerequisites: 10-605-112 and 10-605-118.

10-605-131 Technical Calculus 1 4 credits

This is an introductory course that examines analytic geometry, binomial series, differentiation of algebraic, exponential, logarithmic and trig. Functions and integration of algebraic functions. An emphasis is placed on the application of each of these topics to problems in science and engineering. Prerequisite: 20-804-213.

10-605-132 Technical Calculus 2 4 credits

This course is a continuation of Technical Calculus 1. Topics include integration techniques, partial derivatives, graphing conics, double integrals, polar coordinates, and first and second order differential equations. Emphasis is placed on applications to problems in science and engineering. Prerequisite: 10-605-131.

10-605-143 Motors and Control Circuits 3 credits

Course covers AC and DC motors, stepping motors, feedback systems, servo controllers, sensors, relays, SCRs, Triacs, MOSFETs, programmable logic controllers, industrial controllers and applied systems and online microcomputer controls. Prerequisites: 10-605-115, 10-605-173 and 10-605-176.

10-605-150 Electronic Data Transmission 3 credits

Covers theory, systems and basic circuits for radio frequency and digital communications systems. Includes transmission, reception, encoding, decoding and information retrieval. Circuits include oscillators, filters, AM, FM, SSB and pulse modulation, PLLs, codecs, transmission lines, and interfacing. Prerequisites: 10-605-113, 10-605-114 and 10-605-119.

10-605-173 Embedded Programming 3 credits

Introduction to the fundamentals of electronic computer language, systems and structure. Embedded processor hardware will be covered from a system level perspective. Programming structures such as loops, branching, data storage, bit-level processing (masking), functions, arrays, pointers and structures will be covered. Languages include ANSI C, Embedded C Language and principles of assembly language. Prerequisite: 10-605-118.

10-605-176 Microcontrollers 3 credits

Course covers a study of microcontrollers and digital systems. Topics include Embedded C programming of Microcontrollers, Basic architectural concepts, parallel and serial I/O, Interrupts, Timer Subsystems, Analog to Digital conversion, Asynchronous Serial Communications (USART), CAN Bus communications, Synchronous Serial Communications (MSSP/SPI/IC2 Bus), Pulse Width Modulation (PWM), and basic control concepts. Prerequisites: 10-605-173 and 10-605-119.

10-662-112 AC-DC Electronics 3 3 credits

Topics include analysis of series and parallel AC RLC circuits, utilizing series and parallel equivalent circuits, superposition, Delta-Wye transformations, and Nodal Analysis. Real, reactive, and apparent power in AC circuits along with ideal loads in both single and three phase circuits are studied. Lab work includes analysis, computer simulation and actual measurements. Prerequisite: 10-605-114.

10-662-124 Circuit Analysis 3 credits

Topics include variable frequency analysis of RLC circuits, first order Bode plots, and correlation of time and frequency response. Semiconductor devices and circuits, including diodes, bipolar transistors and field effect transistors are studied. The time and frequency response of single stage BJT and FET amplifiers is examined. Lab work includes analysis, computer simulation, and actual measurements. Prerequisites: 10-662-112 and 10-605-115.

Alternate Math Selections

20-804-231 Calculus & Analytic Geometry 1 5 credits
20-804-232 Calculus & Analytic Geometry 2 5 credits
20-804-233 Calculus & Analytic Geometry 3 3 credits
(All three required in lieu of Technical Calculus 1 & 2 for MSOE transfer.)

*Students wishing to transfer to the UW system or other 4-year college should contact a program advisor and the receiving college or university about transferring credits.

*Courses from the Liberal Studies Program-College Transfer Option (800-series) can be used in lieu of required courses.

Career Potential:

- Engineering Assistant
- Electronic Development Technician
- Electronic Technician
- Electronic Maintenance Technician
- Electronic Test Technician
- Field Service Technician

With additional education and/or work experience, graduates may find employment as:

- Electrical Engineer
- Electronic Engineer
- Computer Engineer
- Electronic Production Supervisor
- Electronic Maintenance Supervisor
- Field Service Engineer
- Network Engineer

More detailed and updated information on this program may be available at: malcmadison.edu. The college reserves the right to make changes in the regulations and courses announced in this publication without notice.

Madison Area Technical College provides equal opportunity in education and employment.

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