Electrical Engineering Technology

Program Mission Statement

The mission of the Electrical Design Concentration is to provide a quality learning environment conducive to providing students with the skills and competencies necessary for employment or career advancement as engineering technicians in the electrical/industrial controls field of industry. The education can be used to transfer to the university level.

TAC/ABET Engineering Technology Criteria

Program Educational Objectives and Program outcomes must support TAC/ABET Engineering Technology criteria a – k:

(a) an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines,
(b) an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology,
(c) an ability to conduct, analyze, and interpret experiments and apply experimental results to improve processes,
(d) an ability to apply creativity in the design of systems, components or processes appropriate to program objectives,
(e) an ability to function effectively on teams,
(f) an ability to identify, analyze, and solve technical problems,
(g) an ability to communicate effectively,
(h) a recognition of the need for, and an ability to engage in lifelong learning,
(i) an ability to understand professional, ethical, and social responsibilities,
(j) a respect for diversity and knowledge of contemporary professional, societal, and global issues, and
(k) a commitment to quality, timeliness, and continuous improvement.

Program Educational Objectives and Program outcomes must also support TAC/ABET Electrical Engineering Technology criteria a and b:

a. the application of circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers to the building, testing, operation, and maintenance of electrical/electronic(s) systems.
b. the applications of physics or chemistry to electrical/electronic(s) circuits in a rigorous mathematical environment at or above the level of algebra and trigonometry.

Program Educational Objectives

Two to three years after matriculation, the graduate of the Electrical Engineering Technology will be able to:

EO-1. apply general and discipline specific concepts, methods, and technology to identify, analyze, and solve technical problems;

EO-2. communicate technical material in a professional manner to potentially diverse audiences and in a variety of circumstances;

EO-3. demonstrate teamwork and ethical, respectful, and professional behavior in all associations;

EO-4. recognize and appreciate the environmental, social, and fiscal impact of the technical professions in local, national, and global context;

EO-5. demonstrate commitment to personal continuous improvement and lifelong learning;

Program Outcomes

The graduating student will be able to:

PO-1. write and orally present technical reports using correct technical vocabulary.
Assessment: Performance on laboratory reports, oral presentations, and case studies. a, c, f, g, & k

PO-2. apply creativity and teamwork to the solution of problems in case studies and design assignments with an awareness of societal issues and ethical responsibilities.
Assessment: Performance on case studies and design assignments. d, g, e, f, i, & j

PO-3. identify, analyze and solve technical problems using correct theory, laws, and formulas, including physics, to electrical/electronic circuits.
Assessment: Performance on homework assignments, laboratory exercises, final exams, and the design concentration exit exam. a, f, Electrical - b

PO-4. assemble, test, maintain, troubleshoot, analyze, and interpret experiments relating to electrical/electronic systems and measure electrical/electronic quantities using state-of-the-art instruments and tools in a safe manner.
Assessment: Performance on laboratory exercises, laboratory reports, case studies and design assignments. a, c e, f, k, d, g, Electrical - a

PO-5. perform information technology skills including word processing, spread sheets, electrical/electronic simulations, computer programming, internet/library research, and CAD drawing encouraging and increasing one's abilities for lifelong learning.
Assessment: Performance on laboratory reports and case studies. a, b, d, g, h, & k

PO-6. understand and explain the operation of industrial electrical/electronic devices and circuits.
Assessment: Performance on laboratory reports, and case studies. a, b Electrical – a, b

Note: A program assessment committee will evaluate the assessments of program objectives and processes. Faculty members will evaluate performance on program objectives using a variety of assessment rubrics and methods developed by the program assessment committee.

ELET 1110 Electric Circuits I

Course Outcomes: The student will be able to:

CO-1. use correct technical vocabulary. (PO-1)

CO-2. analyze and solve problems in basic dc circuits including series circuits, parallel circuits, and series-parallel circuits using correct theory, laws, and formulas. (PO-3)

CO-3. follow laboratory procedures to assemble, test and troubleshoot basic circuits using state-of-the-art instruments, and record the measurements. (PO-4)

Learning Objectives: The student will be able to:

LO-1. assemble basic dc circuits on a breadboard using a schematic diagram as a guide. (CO-3)

LO-2. measure the fundamental electrical quantities using digital and analog multi-meters and an oscilloscope. (CO-3)

LO-3. observe and record data in dc/ac electric circuits in a precise manner. (CO-3)

LO-4. recognize and use letter symbols for fundamental electrical quantities, engineering prefixes, and schematic symbols for electrical components. (CO-1)

LO-5. understand and apply fundamental electrical theory and laws in basic series dc circuits including Ohm's Law, Power, Kirchhoff's Voltage Law, and Kirchhoff's Current Law. (CO-2)

LO-6. understand and apply fundamental electrical theory and laws in basic parallel dc circuits including Ohm's Law, Power, Kirchhoff's Voltage Law, and Kirchhoff's Current Law. (CO-2)

LO-7. understand and apply fundamental electrical theory and laws in basic series-parallel dc circuits including Ohm's Law, Power, Kirchhoff's Voltage Law, and Kirchhoff's Current Law. (CO-2)

Course Outcomes: The student will be able to:

CO-1. use correct technical vocabulary. (PO-1)

CO-2. analyze and solve problems in basic ac circuits including series circuits, parallel circuits, and series-parallel circuits using correct theory, laws, and formulas. (PO-3)

CO-3. follow laboratory procedures, measure electrical/electronic quantities using state-of-the-art instruments, and record the measurements. (PO-4)

CO-4. use scientific calculator and computer simulation software to solve electrical problems. (PO-5)

Learning Objectives: The student will be able to:

LO-1. assemble basic ac circuits on a breadboard using a schematic diagram as a guide. (CO-3)

LO-2. measure the fundamental electrical quantities using a multi-meter and an oscilloscope. (CO-3)

LO-3. observe and record data in an ac electric circuit in a precise manner. (CO-3)

LO-4. use a scientific calculator and electrical/electronic simulation software to calculate fundamental electrical quantities in basic ac circuits. (CO-4)

LO-5. recognize and use letter symbols for fundamental electrical quantities, engineering prefixes, and schematic symbols for electrical ac components. (CO-1)

LO-6. understand and apply fundamental electrical theory and laws in basic series ac circuits including Ohm's Law, Power, Kirchhoff's Voltage Law, and Kirchhoff's Current Law. (CO-2)

LO-7. understand and apply fundamental electrical theory and laws in basic parallel ac circuits including Ohm's Law, Power, Kirchhoff's Voltage Law, and Kirchhoff's Current Law. (CO-2)

LO-8. understand and apply fundamental electrical theory and laws in basic series-parallel ac circuits including Ohm's Law, Power, Kirchhoff's Voltage Law, and Kirchhoff's Current Law. (CO-2)

ELET 2111 Power Technology

Course Outcomes: The student will be able to:

CO-1. write and orally present technical reports relating to energy conversions using correct technical vocabulary. (PO-1)

CO-2. identify, analyze and solve technical problems in energy conversions using correct theory, laws, and formulas. (PO-3)

CO-3. perform, analyze, and interpret experiments in energy conversions and measure electrical/electronic quantities using state-of-the-art instruments and tools. (PO-4)

CO-4. perform information technology skills including word processing and internet/library research. (PO-5)

CO-5. explain the operation of industrial electrical/electronic devices and circuits such as motors and transformers. (PO-6)

Learning Objectives: The **student** will be able to:

LO-1. write and orally present technical reports at different formal levels and perform technical research. (CO-1, CO-4)

LO-2. identify the letter symbols for fundamental electrical quantities and schematic symbols for electrical power components and circuits. (CO-1, CO-5)

LO-3. measure fundamental electrical and mechanical quantities using power analyzers, tachometers, and torque scales. (CO-3)

LO-4. use fundamental laws, equations, and phenomena to explain the characteristics of electromechanical devices. (CO-2, CO-5)

LO-5. apply the fundamental concepts of magnetism and electromagnetic induction to electromechanical devices and solve fundamental motor, transformer, and three-phase problems. (CO-2, CO-5)

LO-6. connect and perform test procedures on ac and dc motors, transformers, and three-phase circuits using schematic diagrams, pictorial diagrams, and technical descriptions. (CO-3)

LO-7. interpret the results of experiments using the fundamental laws and equations of electromechanical devices as a guide. (CO-3)

ELET 2112 Digital Industrial Controls

Course Outcomes: The student will be able to:

CO-1. write and orally present technical reports related to digital industrial controls using correct technical vocabulary. (PO-1)

CO-2. apply creativity to the solution of digital industrial controls problems in case studies and design assignments. (PO-2)

CO-3. identify, analyze and solve digital industrial controls problems using correct theory, laws, and formulas. (PO-3)

CO-4. assemble, test, troubleshoot, demonstrate, and interpret experiments and measurements with digital industrial control circuits and computer/programmable logic controller programs. (PO-4)

CO-5. perform information technology skills including word processing, spread sheets, electrical/electronic simulations, computer programming, internet/library research, and CAD drawing. (PO-5)

CO-6. explain the operation of sequential logic circuits to interface and control industrial devices. (PO-6)

Learning Objectives: The student will be able to:

LO-1. write technical reports based on electronic theory and empirical laboratory data (CO-1, CO-6)

LO-2. solve synchronous and asynchronous, sequential logic problems. (CO-2, CO-3)

LO-3. measure digital logic signals with a digital logic probe and an oscilloscope. (CO-4)

LO-4. use the Internet to access manufacturers' data sheets. (CO-5)

LO-5. interpret manufacturers' data sheets. (CO-5, CO-6)

LO-6. assemble, troubleshoot, and demonstrate the operation of synchronous and asynchronous, sequential logic circuits to control industrial devices in lab exercises and case studies (CO-2, CO-4).

LO-7. demonstrate competencies in oral communications and technical presentations by participating in subject-related case studies. (CO-1, CO-2)

ELET 2201 Programmable Controllers

Course Outcomes: The student will be able to:

CO-1. write and orally present technical reports related to programmable logic controllers using correct technical vocabulary. (PO-1)

CO-2. apply creativity to the solution of problems in case studies and design assignments related to programmable logic controllers and the electrical/electronic devices and circuits that interface to them. (PO-2)

CO-3. identify, analyze and solve programmable logic controller problems using correct theory, laws, and formulas. (PO-3)

CO-4. write, test, troubleshoot and correct faults, and demonstrate the operation of programmable logic controller programs. (PO-4)

CO-5. perform information technology skills including word processing, computer programming, and internet/library research. (PO-5)

CO-6. explain the operation of programmable logic controllers and the industrial electrical/electronic devices and circuits that interface to them. (PO-6)

Learning Objectives: The student will be able to:

LO-1. write technical reports at different formal levels and perform technical research. (CO-1, CO-5)

LO-2. configure, program, and operate an industrial programmable logic controller (PLC). (CO-4, CO-5)

LO-3. operate industrial control devices, such as switches and displays, that are interfaced to a programmable logic controller – PLC. (CO-4, CO-5, CO-6)

LO-4. configure communications protocols and operate programmable logic controllers (PLCs), human-machine-interfaces (HMIs), and personal computers on an industrial/Ethernet network. (CO-4, CO-5, CO-6)

LO-5. demonstrate competencies in oral and written communications and technical presentations. (CO-1, CO-2, CO-5)

LO-6. identify the mnemonics and ladder program symbols for a programmable logic controller (PLC) instruction set and configure instructions for a particular application. (CO-4, CO-6)

LO-7. identify the symbols for industrial control devices and explain how the devices work in a particular application. (CO-6)

LO-8. write, troubleshoot, and demonstrate a programmable logic controller (PLC) program. (CO-4, CO-5, CO-6)

LO-9. apply the fundamental concepts of number systems and Boolean logic to a programmable logic controller (PLC) program. (CO-2, CO-3)

ELET 2202 Microprocessor based Instrumentation and Control

Course Outcomes: The student will be able to:

CO-1. write and orally present technical reports related to microprocessor based instrumentation and control using correct technical vocabulary. (PO-1)

CO-2. apply creativity to the solution of problems in case studies and design assignments related to microprocessor based instrumentation and control. (PO-2)

CO-3. identify, analyze and solve microprocessor based instrumentation and control problems using correct theory, laws, and formulas. (PO-3)

CO-4. assemble, test, troubleshoot, analyze, and interpret microprocessor based instrumentation and control experiments and measure electrical/electronic quantities using state-of-the-art instruments and tools. (PO-4)

CO-5. perform information technology skills including word processing, spread sheets, electrical/electronic simulations, computer programming, internet/library research, and CAD drawing. (PO-5)

CO-6. explain the operation of industrial electrical/electronic devices and circuits. (PO-6)

Learning Objectives: The student will be able to:

LO-1. find and interpret manufacturers' data sheets. (CO-5, CO-6).

LO-2. write technical reports based on electronic theory and empirical laboratory data. (CO-1, CO-6)

LO-3. demonstrate competencies in oral and written communications and technical presentations by participating in subject-related case studies. (CO-1, CO-2, CO-5)

LO-4. solve industrial control problems using microcontroller hardware and software. (CO-3)

LO-5. measure digital logic signals with a digital logic probe and an oscilloscope. (CO-4)

LO-6. program, edit, and debug microcontroller software programs. (CO-4, CO-5, CO-6)

LO-7. assemble, troubleshoot, and demonstrate microcontroller circuits and interfaces used in industrial controls. (CO-3, CO-4, CO-6)

Course Outcomes: The student will be able to:

CO-1. write and orally present technical reports related to robotics and industrial control systems using correct technical vocabulary. (PO-1)

CO-2. apply creativity to the solution of problems in case studies and design assignments related to robotics and industrial control systems. (PO-2)

CO-3. identify, analyze, and solve robotics and industrial control systems problems using correct theory, laws, and formulas. (PO-3)

CO-4. assemble, test, troubleshoot, analyze, and interpret robotics and industrial control experiments and measure electrical/electronic quantities using state-of-the-art instruments and tools. (PO-4)

CO-5. perform information technology skills including word processing, electrical/electronic simulations, and internet/library research. (PO-5)

CO-6. explain the operation of industrial electrical/electronic devices and circuits. (PO-6)

Learning Objectives: The student will be able to:

LO-1. read and write technical reports at different formal levels and perform technical research. (CO-1, CO-5)

LO-2. write a program for an industrial robot and execute the program. (CO-2, CO-4, CO-5)

LO-3. draw schematic diagrams of open and closed loop digital and analog electronic circuits using semi conductor data sheets and lab assignments as a guide. (CO-2, CO-4, CO-5)

LO-4. assemble, troubleshoot, and demonstrate open and closed loop digital and analog electronic circuits using schematic diagrams and semi conductor data sheets as a guide. (CO-4)

LO-5. measure fundamental electrical and mechanical quantities using, an oscilloscope, tachometer, and power analyzer/ammeter. (CO-4)

LO-6. use fundamental laws, equations, and phenomena to explain the characteristics of electromechanical devices. (CO-3, CO-4)

LO-7. interpret the results of experiments using the fundamental laws and equations of electromechanical devices as a guide. (CO-4)

LO-8. demonstrate competencies in oral and written communications and technical presentations. (CO-1, CO-2, CO-5)

LO-9. identify the devices in a servo-control system and explain how the devices work in a particular application. (CO-6)

LO-10. use and understand the concepts and equations for a proportional plus integral plus derivative (PID) closed loop control system. (CO-3)

LO-11. simulate open and closed loop control systems using software. (CO-4, CO-5)

TLET 1010 Electronic Circuits I

Course Outcomes: The student will be able to:

CO-1. recognize and use basic diode circuits. (PO-3, PO-4)

CO-2. understand and use basic transistor circuits. (PO-3, PO-4)

CO-3. understand and use basic operational amplifier circuits. (PO-3, PO-4)

CO-4. use variety of sources to obtain specifications of electronic devices. (PO-5)

CO-5. use electronic test equipment to obtain data about electronic devices and circuits. (PO-4)

CO-6. write technical reports related to basic electronic circuits using correct technical vocabulary. (PO-1)

Learning Objectives: The student will be able to:

LO-1. understand, build, and test half-wave and full-wave rectifiers. (CO-1)

LO-2. understand, build, and test zener, limiter, and LED circuits. (CO-1)

LO-3. understand, build, and test base-bias and voltage divider bias transistor circuits. (CO-2)

LO-4. understand, build, and test transistor switching and amplifier circuits. (CO-2)

LO-5. understand, build, and test inverting and non-inverting op am circuits. (CO-3)

LO-6. use databooks and Internet sources to find specifications for diodes and transistors. (CO-4)

LO-7. use curve tracers, oscilloscopes, and multi-meters to test and verify specifications of diodes and transistors and their circuits. (CO-5)

LO-8. write technical reports based on electronic theory and empirical laboratory data. (CO-6)

TLET 2233 Electrical/Electronic CAD Drawing

Course Outcomes: The student will be able to:

CO-1. create block diagrams and schematics of electrical/electronic circuits using computer aided drawing program. (PO-5)

CO-2. create electrical/electronic symbol library using a computer aided drawing program. (PO-5)

Learning Objectives: The student will be able to:

LO-1. use blocks, leaders, symbols, and text to create diagrams and schematics. (CO-1)

LO-2. create and use electrical/electronic symbols to scale. (CO-2)

CPET 1104 Microcomputer Applications for Technicians

Course Outcomes: The student will be able to:

CO-1 Study the components of a microcomputer and obtain an understanding of how the operating system manages its resources. (PO-5, PO-6)

CO-2 Obtain an understanding of the basic features of the Windows 2000 operating system environment. (PO-5)

CO-3 Prepare a written formal report. (PO-1)

CO-4 Present an oral report. (PO-2)

CO-5 Obtain an understanding of microcomputer application programs including Microsoft Word, Microsoft Excel and Electronic Workbench. (PO-5)

CO-6 Study the fundamentals required to develop a program in the C++ language. (PO-5)

Learning Objectives: The student will be able to:

LO-1 Identify the major components of a microcomputer. (CO-1)

LO-2 Use of the Windows 2000 operating system for management. (CO-2)

LO-3 Use the Windows Notepad editor and Clipboard accessories. (CO-2)

LO-4 Create folders and move and copy files between folders using Windows 2000. (CO-2)

LO-5 Become familiar with the basic functions of Microsoft Excel. (CO-5)

LO-6 Be able to create, save, and print a Word document having specified margins, justification and indentations.
Be able to perform copy, move, search, and replace operations in a Word document. (CO-5)

LO-7 Be able to complete a written report and oral presentation on a computer-related topic that meets specifications supplied by the instructor. (CO-3, CO-4)

LO-8 Be able to create, save and print a spreadsheet containing a specified set of calculations and cell formats. (CO-5)

LO-9 Be able to simulate a DC circuit using Electronic Workbench for Windows. (CO-5)

LO-10 Become familiar with some of the basic features of the C++ programming language. (CO-6)

LO-11 Become Be able to write, save, compile, run and print a simple C++ program. (CO-6)

LO-12 Be able to write a C++ program containing basic looping and decision structures. (CO-6)

CPET 1124 Digital Circuits

Course Outcomes: The student will be able to:

CO-1 Convert various number bases and apply mathematical laws to hex, decimal, and binary numbering systems. (PO-3)

CO-2 Prepare written formal reports. (PO-1)

CO-3 Apply various techniques for logic circuit reduction. (PO-3)

CO-4 Design and troubleshoot combinational logic circuits. (PO-4)

CO-5 Construct logic circuits using various prototyping techniques. (PO-4)

CO-6 Construct arithmetic circuits. (PO-4)

CO-7 Design and construct digital counter circuits. (PO-4)

CO-8 Design and construct sequential digital logic circuits. (PO-4)

Learning Objectives: The student will be able to:

LO-1 Convert between hex, decimal, and binary numbering systems. (CO-1)

LO-2 Apply mathematical laws to hex, decimal, and binary numbering systems. (CO-1)

LO-3 Apply the laws of Boolean algebra for circuit reduction. (CO-3)

LO-4 Apply Karnaugh mapping for circuit reduction. (CO-3)

LO-5 Understand and construct combinational logic circuits. (CO-4)

LO-6 Understand and construct an Adder/Subtractor circuit. (CO-6)

LO-7 Complete written laboratory reports that follow the guidelines established by the department. (CO-2)

LO-8 Understand and construct an Overflow logic circuit. (CO-6)

LO-10 Understand and construct flip-flop circuits. (CO-7)

LO-11 Understand and construct digital counter circuits. (CO-7)

LO-12 Understand and construct sequential digital logic circuits. (CO-8)

LO-13 Construct circuit prototypes using breadboards and by soldering printed circuit boards. (CO-5)