

## ELT Electronics Engineering Technology

### ELT 101 DC Network Analysis (3-3) 4 crs.

Studies direct current (DC) resistive networks. Definitions, symbols and notations for electrical quantities are taught. Circuit properties and their applications to significant circuit configurations are examined. High school algebra is recommended.

### ELT 102 AC Network Analysis (3-3) 4 crs.

Examines steady state alternating current (AC), resistor-capacitor (RC) and resistor-inductor (RL) circuits. Also examines RC and RL single time constant circuits. Single phase and polyphase AC networks are also studied.

**Prerequisite:** ELT 101 and MTH 103 with grades of C or better, or consent of instructor.

### ELT 103 RF Network Analysis (3-3) 4 crs.

Examines basic radio frequency (RF) networks, series and parallel resonance, filters, selectivity and bandwidth, and impedance matching.

**Prerequisite:** ELT 102 with a grade of C or better, or consent of instructor.

### ELT 110 Introductory Electronics (3-3) 4 crs.

Introduces fundamentals of electricity and magnetism. Covers basic electrical laws and principles. Presents electrical quantities, units, symbols and notation. Examines foundational electronic materials and components. Presents elementary DC (direct current) and AC (alternating current) network analysis, key semiconductor devices, and simple analog and digital circuits. Also covers electrical safety considerations, laboratory instrumentation and test and measurement techniques.

### ELT 111 Semiconductor Devices and Circuits (1-2) 2 crs.

Examines basic semiconductor component families and characteristics. Fundamentals of proper circuit operation and typical applications are further examined.

**Prerequisite:** ELT 110 with a grade of C or better, or consent of instructor.

### ELT 120 Introductory Industrial Electronics Maintenance (1-2) 2 crs.

Introduces students to the fundamentals of industrial electronics maintenance. Provides an overview of the various technologies encountered in the field as they relate to industrial electronic control of buildings and facilities. This includes basic electrical and electromechanical components and machinery, motors and controls, electrical and electronic interfaces, and electronic controllers. Also covers fluid power and piping systems. Emphasis is placed on safety, installation and preventative maintenance. Use of tools, test instrumentation and the importance of record keeping will be discussed.

### ELT 135 Optics and Sensors (1-2) 2 crs.

Investigates sensor operation and application for a variety of functions: tactile, photo, fiber-optic, magnetic, thermal, sonic, pressure and vision systems.

### ELT 140 Introduction to Programmable Logic Controllers (1-2) 2 crs.

Examines the procedures and mechanisms by which programmable logic controller functions are used. Programming in ladder logic and controller code focuses on the direct application of a variety of input and output devices. Hardware, programming, peripherals and accessories are emphasized.

### ELT 142 Residential Wiring (1-2) 2 crs.

Introduces students to wiring topics as they relate to the residential electrical service. A safety review followed by terminology, principles, and test and measurement equipment use associated with residential alternating current (AC) power are examined. Emphasis is placed on the practical application, operation, installation and maintenance of low voltage control systems and single-phase AC power equipment and systems. Select portions of the National Electric Code are studied.

### ELT 143 Commercial Wiring (1-2) 2 crs.

Introduces students to advanced wiring topics as they relate to the commercial electrical service. A safety review followed by terminology, principles, and test and measurement equipment use associated with commercial alternating current (AC) power are examined. Emphasis is placed on the practical application, operation, installation and maintenance of low voltage control systems and single and three-phase AC power equipment and systems. Select portions of the National Electric Code are studied.

### ELT 144 AC and DC Motors (1-2) 2 crs.

Introduces students to fractional horsepower motors for residential and commercial applications. A safety review followed by terminology, principles, and test and measurement equipment use associated with motors and motor controls are examined. Emphasis is placed on the practical application, operation, installation and maintenance of direct current (DC) motors and controls, and single three-phase alternating current (AC) motors and controls.

### ELT 145 Variable Frequency Drives (1-2) 2 crs.

Introduces students to variable frequency drives (VFDs) as they pertain to residential and commercial motor control applications. A safety review followed by terminology, principles, test and measurement equipment use associated with VFDs and typical applications are examined. Emphasis is placed on the practical application, operation, installation and maintenance of VFDs.

### ELT 203 Digital Electronics (3-3) 4 crs.

Examines digital logic circuitry from the underlying structure of Field Effect Transistors (FETs) through how these devices are built into complex integrated circuits (ICs). Includes combinational and sequential logic circuits, binary and hexadecimal number systems, error detection and correction, Boolean algebra, Karnaugh maps, counters, state machines, semiconductor memories, and programmable devices with special emphasis on microcontrollers.

**Prerequisite:** ELT 110 with a grade of C or better.

### ELT 204 Analog Electronics (3-3) 4 crs.

Examines electronic circuits using diodes, transistors and operational amplifiers. Applies linear equivalent circuits as an analysis tool. Studies amplifiers, feedback principles, and operational amplifier configurations as practical applications of the linear analysis techniques.

**Prerequisite:** ELT 111 with a grade of C or better, or consent of instructor.

### ELT 207 Communications Systems (3-3) 4 crs.

Introduces students to communications systems. The historical, technical and commercialization aspects of key technologies and inventions from the onset of early communications equipment to contemporary telecommunications systems are discussed. Covers systems, equipment, and radiating systems and radiation. Topical areas in these segments include wireline and wireless systems, modulation and demodulation, receivers, transmitters and transceivers, transmission lines, antennas, matching networks and wave propagation. Emphasizes system applications, operation and analysis.

**Prerequisite:** ELT 110 with a grade of C or better, or consent of instructor.

**ELT 215 Industrial Control Systems (3-3) 4 crs.**

Introduces students to industrial control systems. Covers fluid power fundamentals, and pneumatic and hydraulic circuit theory. Examines the integration of optics, sensors, and various electronic control systems including programmable logic controller (PLC) and personal computer (PC) controllers. Infrared (IR) emitters and detectors, and laser systems are also examined. Introduces the application and control of automated robotic systems. The course culminates with a capstone team project involving the development, design, construction, presentation and ultimate demonstration of a fully operational automated industrial control system.

**Prerequisite:** ELT 110 and ELT 140 with grades of C or better, or consent of instructor.

**ELT 218 Embedded Microcontroller/Processor Systems (3-3) 4 crs.**

Examines the basics of microcontroller/microprocessor systems. Includes digital and analog input/output (I/O), serial buses, memories/caches, and interfacing to peripherals including sensors, displays, servos and motors. An example of such a system is Arduino hardware and the writing of Arduino C code that are covered in detail.

**Prerequisite:** ELT 203 with a grade of C or better, or consent of instructor.

**ELT 240 Advanced Programmable Logic Controllers (3-3) 4 crs.**

Emphasizes advanced programmable logic controller (PLC) applications and system integration. An overview of PLCs coupled with safety and industry-best practices are discussed. Sensors, PLC ladder logic and PLC functionality are reviewed and the Human Machine Interface (HMI) is examined. Applications involving pneumatic and servo controlled robotics, 2 and 3 dimensional (2D and 3D) vision systems, and industrial and home automation are explored. Lastly, advanced PLC communications protocol, wireless interface/system considerations and Internet of Things (IoT) connectivity are covered.

**Prerequisite:** ELT 110 and ELT 140 with grades of C or better, or consent of instructor.

**ELT 281 Topics in Electronics Engineering Technology (1-0 to 4-0) 1-4 crs.**

Examines selected problems or topics in electronics engineering technology. The specific course content and instructional methodology will vary from semester to semester depending on the material presented. A syllabus containing specific topics will be available with pre-registration materials each time the course is offered. This course may be repeated to a maximum of four credit hours.

**Prerequisite:** Consent of instructor.