

# ELECTRONICS ENGINEERING TECH (ELT)

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## ELT 101 - DC Network Analysis (4 Credits)

*3 lecture, 3 lab, 6 total contact hours*

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. Knowledge of high school algebra assumed.

**Typically offered:** Fall

## ELT 102 - AC Network Analysis (4 Credits)

*3 lecture, 3 lab, 6 total contact hours*

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.

**Typically offered:** Spring

## ELT 110 - Introductory Electronics (4 Credits)

*3 lecture, 3 lab, 6 total contact hours*

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. Start Smart

**Typically offered:** Fall, Spring, Summer

## ELT 111 - Semiconductor Devices and Circuits (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

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.

**Typically offered:** Spring

## ELT 120 - Introductory Industrial Electronics Maintenance (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

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.

**Typically offered:** Spring

## ELT 135 - Optics and Sensors (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

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

**Typically offered:** Fall

## ELT 140 - Introduction to Programmable Logic Controllers (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

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.

**Typically offered:** Fall, Spring

## ELT 142 - Residential Wiring (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

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.

**Typically offered:** Fall, Spring, Summer

## ELT 143 - Commercial Wiring (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

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 three-phase AC power equipment and systems. Select portions of the National Electric Code are studied.

**Typically offered:** Fall, Spring

## ELT 144 - AC and DC Motors (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

Introduces students to fractional horsepower motors for residential and commercial applications. A safety review followed by terminology, principles, and test 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.

**Typically offered:** Spring

## ELT 145 - Variable Frequency Drives (2 Credits)

*1 lecture, 2 lab, 3 total contact hours*

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

**Typically offered:** Fall

## ELT 203 - Digital Electronics (4 Credits)

*3 lecture, 3 lab, 6 total contact hours*

Examines digital logic circuitry from the underlying structure of Field Effect Transistors (FETs) through how these devices are built into complex integrated (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.

**Typically offered:** Fall

**ELT 207 - Communications Systems (4 Credits)**

*3 lecture, 3 lab, 6 total contact hours*

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.

**Typically offered:** Summer

**ELT 215 - Industrial Control Systems (4 Credits)**

*3 lecture, 3 lab, 6 total contact hours*

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.

**Typically offered:** Spring

**ELT 218 - Embedded Microcontroller/Microprocessor Systems (4 Credits)**

*3 lecture, 3 lab, 6 total contact hours*

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.

**Typically offered:** Spring

**ELT 240 - Advanced Programmable Logic Controllers (4 Credits)**

*3 lecture, 3 lab, 6 total contact hours*

Emphasizes advanced programmable logic controller (PLC) applications and system integration. Discusses an overview of PLCs coupled with safety and industry-best practices are discussed. Reviews sensors, PLC ladder logic and PLC functionality and examines the Human Machine Interface (HMI). Explores applications involving pneumatic and servo controlled robotics, 2- and 3-dimensional (2D and 3D) vision systems, and industrial and home automation. Covers advanced PLC communications protocol, wireless interface/system considerations and Internet of Things (IoT) connectivity. Prerequisite: ELT 110 and ELT 140 with grades of C or better, or consent of instructor.

**Typically offered:** Spring

**ELT 281 - Topics in Electronics Engineering Technology (1-4 Credits)**

*1 - 4 lecture, 1 - 4 total contact hours*

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.