

ELECTRICAL AS/BS (ELT)

ELT 281 Engineering Internship

20 Lab Hours, 4 Quarter Credit Hours

ENG 281 Engineering Internship 20 Hours per week for 4 Quarter Credit Hours Students will have the opportunity to integrate career-related experience into the undergraduate AS program by participating in lanned, supervised employment in a related field. This will contribute to the student's personal and professional growth in an Electrical/Mechanical Engineering Technology field and provide invaluable career awareness for students. The internship will also complement what has been learned in the classroom. The internship will include a reflection or evaluation by students at the completion of the internship. This internship requires a minimum of 20 hours per week.

ELT 310 Programmable Automation Controllers and Lab

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: ENG 210

This course will cover advanced PLC programming using the Allen Bradley Control Logix PAC and RSLogix 5000 software. Students will use several PLC languages including Ladder Logic, Sequential Function Chart, Function Block Diagram and Structured Text. Students will also be introduced to Ethernet IP I/O control and VFD network control. Students will develop working automation systems using the Allen Bradley Control Logix PAC. Students will develop these programs in several different PAC programming languages. Labs will also consist of "Remote I/O" systems over Ethernet IP.

ELT 314 C++ Programming

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: ERD 212

This course will focus on variables, input and output objects, if-else structures, switch statements, while and do looping structures, functions and scope of variables, one- and two-dimensional arrays, pointers, and character strings. The flowcharts will be used as a visual aid in solving problems.

ELT 320 Supervisory Control and Data Acquisition (SCADA) and Communication Systems and Lab

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: ELT 310

This course will show students the use of SCADA software in various industries. Students will investigate the uses of SCADA systems and how they are used in today's industrial world for system control and data collection. Topics will include system communications such as system alarming, wireless systems, radio telemetry, Ethernet Networks; and data communication systems for computers and industrial network protocol standards. The lab will show students how to develop SCADA software systems for interaction with specific industrial/commercial systems such as water/wastewater. Rockwell Software's Factory Talk SE software will be used for these systems. Data networks, such as Ethernet IP, will be implemented as part of the SCADA programming.

ELT 360 Embedded Microcontrollers

4 Class Hours, 4 Quarter Credit Hours

Prerequisites: ELT 314

Corequisites: ELT 362

The concepts of how a microprocessor/microcontroller processes data will be studied. Arithmetic, logic, control functions and structures will be studied using C/C++ language instructions. Serial communications to a PC and serial LCDs along with interrupts will be included. The controlling of external hardware such as ultrasonic devices, servo motors, DC motors, and stepper motors will be studied. The concepts of flowcharting will also be presented throughout the course. Arduino and RFF flowcharting software will be utilized throughout the term.

ELT 362 Embedded Microcontrollers Lab

4 Lab Hours, 2 Quarter Credit Hours

Prerequisites: ELT 314

Corequisites: ELT 360

This course will focus on the Arduino Microprocessor and instruction set. Students will write C++ code for labs that require the use of timers, serial communication, and interrupts. Control of sensors and electronic devices will also be covered.

ELT 364 Digital Circuit Design

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

This course covers digital circuit functions, the synthesis of logic functions with PLDs and simulation of PLD designs.

ELT 374 Circuit Analysis I

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: MA 320

This course covers nodal and mesh analysis of circuits, applications of Kirchhoff's current and voltage laws, superposition, Norton and Thevenin equivalent circuits. These theorems are used to solve passive and active circuits, which contain both dependent and independent sources. Basic AC circuit analysis is introduced as well as complex numbers. PSpice analysis techniques are used to model both DC and AC circuits.

ELT 384 Circuit Analysis II

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: ELT 374

This second course in electrical circuit analysis extends the principles developed in Circuit Analysis I to circuits which are stimulated by transient and periodic voltage and current sources. This calculus-based course will continue the use of PSpice programming to examine passive and active filters, op-amp circuits, transfer functions, frequency response and the characteristics of periodic waveforms.

ELT 410 Electrical Design and Energy Management & Lab

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

This course will demonstrate the process of designing the electrical distribution systems for commercial and industrial buildings. Students will identify all distribution components, understand specialized electrical needs, design switchboard and panelboard layouts, design and draw a complete electrical plan showing general purpose, specialized and lighting loads as well as the raceways that feed them. Students will use AutoCAD MEP for all system design and layouts. Students will be required to design their systems by applying all necessary National Electrical Codes (NEC). The course will also explore the causes of arc flash faults and calculate arc flash potential and common power quality issues and how to apply common mitigation strategies.

ELT 463 Sensors and Signal Conditioning

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: MA 310 and ELT 374

This course will cover the elements of a control system which will include sensors, transducers and actuators used in process control systems. The analog and digital signal conditioning and instrument calibration with these I/O devices will also be covered. Laboratory assignments will be on sensor signal conditioning, instrumentation calibration and networking of these devices.

ELT 475 Automation and Process Control & Lab

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: MA 310 and (ELT 310 or MCT 310)

This course includes the study of closed-loop process control techniques as applied to automation and systems control. Topics include linear systems analysis, proportional, integral, and derivative control analysis, temperature controllers, composite controller analysis including PID control, transient response analysis, and digital systems design techniques. The lab will use PID controllers and Programmable Automation Controllers (PAC), driven automation control to demonstrate the closed loop control of automated systems.

ELT 486 LabVIEW Programming

3 Class Hours, 2 Lab Hours, 4 Quarter Credit Hours

Prerequisites: ELT 314

This course will use LabVIEW, a graphical programming language, for data acquisition and control of I/O and instruments. Students will learn to apply standard VIs (virtual instruments) and design applications. Interface to external devices and instruments will also be covered.