ELECTRONIC SYSTEMS ENGINEERING TECHNOLOGY (ESET)

ESET 2101 AC and DC Circuits Lab
Credit: 1 (0-3-0)
Experiments on DC and AC circuits with precision electronic instruments to support the learning in ENTC 2301. Will include network analysis, and steady state analysis of AC circuits.

Corequisites: ESET 2301 and MATH 2313. TSI Restriction(s): Reading, Math, and Writing.

Restrictions: Graduate level students may not enroll.

ESET 2102 Analog Circuits Lab
Credit: 1 (0-3-0)
Experiments on analog circuits with precision electronic instruments to support the learning in ENTC 2103. Will include experiments on Op-Amp circuits, biasing and active loads, and non-ideal effects in Op-Amp circuits.

Prerequisites: ESET 2101 and ESET 2301.

Corequisites: ESET 2302 and MATH 2314. TSI Restriction(s): Reading, Math, and Writing.

Restrictions: Graduate level students may not enroll.

ESET 2301 AC and DC Circuits
Credits: 3 (3-0-0)
Voltage, current, and resistance in DC circuits. The circuit abstraction, resistive networks, network theorems, analysis of nonlinear circuits. Study of AC circuits in the sinusoidal steady state.

Corequisites: ESET 2101 and MATH 2313. TSI Restriction(s): Reading, Math, and Writing.

Restrictions: Graduate level students may not enroll.

ESET 2302 Analog Circuits
Credits: 3 (3-0-0)
Ideal Operational Amplifiers and Op-Amp circuits, Integrated circuit biasing and active loads. Differential and multistage amplifiers. Feedback and stability. Op-Amp circuits. Non-ideal effects in Op-Amp circuits.

Prerequisites: ESET 2101 and ESET 2301.

Corequisites: ESET 2302 and MATH 2314. TSI Restriction(s): Reading, Math, and Writing.

Restrictions: Graduate level students may not enroll.

ESET 3101 Digital Electronics Lab
Credit: 1 (0-3-0)
Experiments on digital electronics with precision electronic instruments to support the learning in ESET 3301. Will include experiments on MOSFET and bipolar circuits.

Corequisites: ESET 3301.

Restrictions: Graduate level students may not enroll.

ESET 3102 Found of Wireless Commun I
Credit: 1 (0-3-0)
Experiments on wireless communication from a digital signal processing perspective to support the learning in ESET 3302. Will include experiments on wave generation, propagation, interference, and wireless channels.

Corequisites: ESET 3302.

Restrictions: Graduate level students may not enroll.

ESET 3103 Found of Wireless Commun II
Credit: 1 (0-3-0)
Experiments on linear modulation, demodulation, and orthogonal frequency division, multiplexing, synchronization, channel estimation, and equalization. Communication in fading channels and wireless standards.

Corequisites: ESET 3303.

Restrictions: Graduate level students may not enroll.

ESET 3104 Programmable Logic Controllers
Credit: 1 (0-3-0)
Experiments on Programmable Logic Controllers (PLCs) to support the learning in ENTC 3304. Introduction to Ladder Logic Diagrams and PLCs, Latches, Logic Gates, Timers, Drum Sequencers, Counters, Motor Control, and PLCs with ADCs and DACs.

Corequisites: ESET 3304.

Restrictions: Graduate level students may not enroll.

ESET 3105 Near and Far Field Commu Lab
Credit: 1 (0-3-0)
Experiments on electromagnetic wave characteristics in the near and far field regions to support the learning in ESET 3205. Measurement of wave characteristics, and the impact of antenna design on waves, in the near and far regions.

Corequisites: ESET 3205.

Restrictions: Graduate level students may not enroll.

ESET 3205 Near and Far Field Communicati
Credits: 2 (2-0-0)
The nature and characteristics of the electromagnetic field radiated from an antenna in near and far field regimes. Transition from near to far field. Relation between transmitting antenna and receiving antenna in the near field region. Antenna design for near and far field communication. Data encryption in wireless communication.

Prerequisites: ESET 3303.

Corequisites: ESET 3105.

Restrictions: Graduate level students may not enroll.

ESET 3301 Digital Electronics
Credits: 3 (3-0-0)
The digital abstraction, The MOSFET switch, The MOSFET amplifier, MOSFET digital circuits, Bipolar digital circuits. The small signal model. Energy storage elements. First-order transients. Energy and power in digital circuits. Transients in second order circuits.

Prerequisites: ESET 2302, PHYS 2325.

Corequisites: ESET 3101.

Restrictions: Graduate level students may not enroll.

ESET 3302 Found of Wireless Commun I
Credits: 3 (3-0-0)
Applications and requirements of wireless services. Technical challenges of wireless communications. Noise and interference limited systems. Propagation mechanisms. Statistical description of the wireless channel. Wideband and directional channel characterization, channel models, channel sounding. Antennas.

Corequisites: PHYS 2326, ESET 3102.

Restrictions: Graduate level students may not enroll.

ESET 3303 Found of Wireless Commun II
Credits: 3 (3-0-0)
Structure of a wireless communication link. Modulation formats, Demodulation, Diversity, Channel coding and information theory. Speech coding. Equalizers. Multiple access and the cellular principle. Spread spectrum systems. Orthogonal frequency division multiplexing. Multiantenna systems.

Prerequisites: ESET 3302.

Corequisites: ESET 3103.

Restrictions: Graduate level students may not enroll.

ESET 3304 Programmable Logic Controllers
Credits: 3 (3-0-0)
Logic basics, Boolean algebra. Simplifying logic circuits. State combination circuits design. PLC memory and file structure. Analog and discrete input output modules. Instructions for relays, timers, and counters, and proportional integral-derivative controller.

Prerequisites: ESET 3301.

Corequisites: ESET 3104.

Restrictions: Graduate level students may not enroll.

ESET 4101 Control Systems Lab
Credit: 1 (0-3-0)
Practical aspects of control systems. Companion course to ENTC 4301. Exercises on frequency response system identification, PID control design, Stability simulation, Root locus analysis and informal design, and Feedback linearization.

Corequisites: ESET 4201.

Restrictions: Graduate level students may not enroll.

ESET 4102 Electronics Testing Lab
Credit: 1 (0-3-0)
Practical aspects of electronic testing. Companion course to ENTC 4302. Exercise on defects, failures, and faults, current testing, application of the various test techniques for reliability assurance.

Corequisites: ESET 4202.

Restrictions: Graduate level students may not enroll.

ESET 4103 Digital Hardware Design Lab
Credit: 1 (0-3-0)
Practical aspects of digital hardware design. Companion course to ESET 4303. Exercises on Combinational Design, Adders, Signed numbers, and their applications in building complex digital hardware.

Corequisites: ESET 4203.

Restrictions: Graduate level students may not enroll.

ESET 4105 Sensors and Instrumentation La
Credit: 1 (0-3-0)
Design of tools for making physical measurements and conducting experiments. Exercises on data collection, analysis, and design of experimental systems. Building the electronics for computer-based data acquisition systems for mechanical, electrical, and environmental systems. Will include team project on design and execution of an experiment that involves measurement, data acquisition, and data analysis.

Corequisites: ESET 4205.

Restrictions: Graduate level students may not enroll.

ESET 4106 Embedded & Connected Smart Dev
Credit: 1 (0-3-0)
Companion course to ENTC 4306. Exercises on communication with sensors and actuators through serial protocols and buses. Creating wired and wireless networks. Programming on embedded and mobile platforms. Visualization and analytics on sensor data. Project on creating end-to-end one IoT application.

Corequisites: ESET 4206.

Restrictions: Graduate level students may not enroll.

ESET 4107 Electronic Design Smart Card
Credit: 1 (0-3-0)
Companion course to ESET 4307. Exercises on smart card design for applications in banking, medical and health care sectors, card security, games on attacking card security and designing defenses.

Corequisites: ESET 4207.

Restrictions: Graduate level students may not enroll.

ESET 4108 Unmanned Mobile Sys Architectu
Credit: 1 (0-3-0)
Companion course to ESET 4208. Exercises on disassembling a toy motorized boat and an Unmanned Aerial Vehicle (UAV), studying and testing their subsystems. Defining mission requirements, designing, architecting, and building an Unmanned Mobile System as a group project.

Corequisites: ESET 4208.

Restrictions: Graduate level students may not enroll.

ESET 4201 Control Systems
Credits: 2 (2-0-0)
Interactions between engineered systems and signals, Mechanical, electrical, and electromechanical system modeling, Laplace Transform techniques, Role of transfer functions, Stability, Systems and control design. Control theory, Open loop and closed loop control, Design Proportional (P), Proportional Integral (PI), Proportional Derivative (PD), Proportional Derivative Feedback (PDFB) and Proportional Integral Derivative (PID) controllers. Empirical Ziegler Nichols Method to design effective P, PI and PID controllers.

Corequisites: ESET 4101.

Restrictions: Graduate level students may not enroll.

ESET 4202 Electronics Testing
Credits: 2 (2-0-0)
Overview of Testing - Defects, Failures, and Faults. Design Representation, VLSI Design Flow. Role of Simulation in Testing. Automatic Test Pattern Generation. Current Testing, Ad Hoc Test Techniques, Scan-Path Design, Boundary-Scan Testing, Built-in Self-Test, Memory Testing, Testing FPGAs and Microprocessors. Synthesis for Testability.

Prerequisites: ESET 3301.

Corequisites: ESET 4102.

Restrictions: Graduate level students may not enroll.

ESET 4203 Digital Hardware Design
Credits: 2 (2-0-0)
Combinational logic design, Sequential logic design, Hardware description language, Digital building blocks, Digital architecture, Microarchitecture, Memory and I/O systems, Digital system implementation.

Prerequisites: ESET 3301 and CSCI 1436 or (CSCI 1336 and 1136).

Corequisites: ESET 4103.

Restrictions: Graduate level students may not enroll.

ESET 4205 Sensors and Instrumentation
Credits: 2 (2-0-0)
Fundamental technology and practical applications of sensors. Capacitive, inductive, optical, electromagnetic, and other sensing methods are examined. Instrumentation techniques incorporating computer control, sampling, and data collection and analysis are reviewed in the context of real-world scenarios.

Prerequisites: ESET 3301.

Corequisites: ESET 4105.

Restrictions: Graduate level students may not enroll.

ESET 4206 Embedded & Connected Smart Dev
Credits: 2 (2-0-0)
Introduction to embedded and smart devices. Components of embedded systems. Interfacing with sensors and actuators, amplification, filtering, signal processing, ADC, DAC, Classic networking. Architecture of Internet of Things (IOT), IOT networking, Cloud Computing, Smartphones, Data visualization and analytics. Applications in health, fitness, smart cities, wearables, security, smart home, and various other environments.

Prerequisites: ESET 3301.

Corequisites: ESET 4106.

Restrictions: Graduate level students may not enroll.

ESET 4207 Electronic Design Smart Card
Credits: 2 (2-0-0)
Introduction to electronic design for smart card applications. Components of smart card – secure microprocessors, communication ports, and peripheral components. Communication between the microprocessor and secure chip. Card security, recognizing potential attacks on security and improving system integrity. Avoiding and overcoming design errors.

Prerequisites: ESET 3301.

Corequisites: ESET 4107.

Restrictions: Graduate level students may not enroll.

ESET 4208 Unmanned Mobile Systems Archit
Credits: 2 (2-0-0)
Architecture of an unmanned mobile system (UMS). Subsystems. Defining critical mission requirements and objectives of, and designing and architecting, a UMS to meet them. Integrating the various components and subsystems of a UMS. Analyzing various sensors/payloads to meet the mission requirements and objectives. Incorporating human aspects into the UMS design.

Prerequisites: ESET 3301.

Corequisites: ESET 4108.

Restrictions: Graduate level students may not enroll.

ESET 4304 Electronic Systems Capstone Pr
Credits: 3 (3-0-0)
Upper division ESET majors solve open-ended ESET problems identified in consultation with industrial collaborators. Students work in small groups to identify an opportunity, define the problem, analyze competing needs and requirements, perform prior art and patent searches, develop alternative designs, carry out cost analyses, and select and implement a design solution.

Prerequisites: ESET 3301 and completion of additional 9 hours of upper division ESET coursework.

Restrictions: Graduate level students may not enroll.