

# ELECTRICAL ENGINEERING TECH (EET)

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## EET 1501 Circuit Theory 1 3 s.h.

Theoretical analysis of DC electrical circuits including units conversions, current voltage, power, Ohms Law, Kirchhoffs Laws, network theorems, capacitance, magnetic circuits, inductance and transient analysis of RL and RC circuits.

**Prereq.:** C or better in either MATH 1513, or in either MATH 1510 or MATH 1510C and in either MATH 1511 or MATH 1511C.

**Coreq.:** EET 1501L.

## EET 1501L Circuit Theory 1 Lab 1 s.h.

Use of electrical components to construct circuits and use of electrical instrumentation including meters and oscilloscopes to analyze DC resistive series/parallel networks and basic RC & RL transient circuits. Computer circuit analysis with PSpice. Three hours per week. Concurrent with: EET 1501.

## EET 1502 Circuit Theory 2 3 s.h.

Study of AC sinusoidal waveforms, phasor representations, phasor algebra and phasor diagrams. Solution of steady state single phase series/parallel networks including network theorems, power and power factor, resonant circuits, filters, mutual inductance, transformers and balanced three-phase systems.

**Prereq.:** "C" or better in EET 1501 and EET 1501L; "C" or better in either MATH 1513, or in either MATH 1510 or MATH 1510C and in either MATH 1511 or MATH 1511C.

**Coreq.:** EET 1502L.

## EET 1502L Circuit Theory 2 Lab 1 s.h.

Measure effective values of AC currents and voltages, observe waveforms with oscilloscopes, verify impedance concepts and phasor diagrams for AC series/parallel networks and resonant circuits. Computer circuit analysis with PSpice. Three hours per week. Concurrent with: EET 1502.

## EET 1504 AC/DC Machinery 3 s.h.

This course presents the principles of operation and characteristics of the basic types of direct current machines and alternating current machines. It covers in particular, series, shunt, and compound generators and motors as well as alternators, three phase and single phase motors. The course describes methods of controlling the speed of motors and discusses the basics of variable speed drives. This course is designed to enable the student to understand, specify, connect and satisfactorily apply the various existing types of electric motors and generators. Strong emphasis is placed on the use of manuals/data sheets and machine specifications. Two hours lecture, two hours lab.

**Prereq.:** C or better in EET 1502.

## EET 2605 Electronics 1 3 s.h.

Physical basis of semiconductor materials, diodes, rectifier circuits, Zener diode regulators, clippers, clampers, special purpose diodes. Bipolar junction transistors (BJT) characteristics, bias circuits, equivalent circuit models, amplifiers and field effect transistor (FET) characteristics.

**Prereq.:** EET 1502 and EET 1502L or EET 3725 and EET 3725L, C or better in MATH 1513 or MATH 1510 or MATH 1510C and MATH 1511 or MATH 1511C.

**Coreq.:** EET 2605L.

## EET 2605L Electronics 1 Laboratory 1 s.h.

Use of meters, oscilloscope, transistor curve tracer for experiments on diode characteristics, rectifier circuits, clippers, clampers, Zener regulators, BJT and FET characteristics, BJT bias circuits and amplifiers. Computer circuit analysis with PSpice. Three hours per week. Concurrent with: EET 2605.

## EET 2608 Industrial Controls 3 s.h.

This course covers theory and application of control components and systems. With the use of manuals, handbooks/equipment specifications, students learn to think through the process of diagram development in connecting control devices from control pilot devices and electromagnetic motor starters to programmable logic controllers. The application area of the course is the field in which most students will be employed and will need knowledge. Consequently, control stations, in the lab, equipped with personal computers and programmable logic controllers are designed to be as state-of-the-art as possible. Two hours lecture, two hours lab.

**Prereq.:** None.

## EET 2620 Digital Electronics 2 s.h.

An introductory study of number systems and conversions, codes, Boolean algebra, and logic gates. Includes Boolean function simplification, truth tables, Karnaugh maps, and combination circuits.

**Prereq.:** "C" or better in either MATH 1513 or MATH 1510 or MATH 1510C and MATH 1511 or MATH 1511C.

**Coreq.:** EET 2620L.

## EET 2620L Digital Electronics Lab 1 s.h.

Experiments utilizing digital integrated circuits to implement various logic functions discussed in EET 2620. Three hours per week. Concurrent with: EET 2620.

## EET 3700 Methods in Circuit Analysis 3 s.h.

Review of circuit analysis techniques using phasor algebra; mesh and nodal analysis; Thevenin and Norton equivalents; superposition theorem; three phase circuits; circuit solutions using matrix methods; and Fourier analysis of periodic waveforms with applications to circuit analysis. Two hours lecture and three hours computational lab per week.

**Prereq.:** Grade of C or better in EET 3710 and EET 3710L and EET 3712 and EET 3712L and EET 3715 and MATH 1570 or MATH 1571.

**Prereq. or Coreq.:** MATH 2670.

## EET 3701 Transform Circuit Analysis 3 s.h.

Introduction to LaPlace transforms and the use of LaPlace transforms in circuit analysis, transfer functions, frequency response of networks, poles and zeroes, stability, Bode plots. Two hours lecture and three hours of computational lab per week.

**Prereq.:** MATH 2670 and EET 3700 with a grade of "C" or better.

## EET 3706 Electronics 2 3 s.h.

Field effect transistor (FET) bias circuits and amplifiers, thyristor circuits, frequency effects (Bode plots), differential amplifiers, linear and non-linear op amp circuits, active filters, oscillators and regulated power supplies. Concurrent with: EET 3706L.

**Prereq.:** "C" or better in EET 1502 and EET 1502L and EET 2605 and EET 2605L and MATH 1570.

## EET 3706L Electronics 2 Laboratory 1 s.h.

Experiments involving field effect transistors (FETs), integrated circuits (ICs), operational amplifiers, frequency effects on gain, oscillator circuits and regulated power supplies. Computer circuit analysis with PSpice. Three hours per week. Concurrent with: EET 3706.

## EET 3710 Electrical Machines 3 s.h.

Construction, operating principles and characteristics, efficiency and control of DC motors, generators, and specialized machines. AC single and 3-phase transformers, alternators, induction and synchronous motor principles, characteristics, efficiency and control. Concurrent with: EET 3710L.

**Prereq.:** "C" or better in EET 1502 and EET 1502L and ENT 1505 and MATH 1570.

## EET 3710L Electrical Machines Lab 1 s.h.

Experiments with DC motors and generators and AC transformers, alternators, induction and synchronous motors to observe operation, efficiency, control and machine characteristics. Three hours per week. Concurrent with: EET 3710.

**EET 3712 Programmable Logic Controllers 3 s.h.**

Development of ladder logic programming and application to programmable logic controllers (PLCs). Examination of input/output (I/O) device characteristics and interfacing including both digital and analog I/O. Installation, maintenance and safety practices for PLCs.

**Prereq.:** "C" or better in EET 1502 and EET 1502L and EET 2620 and EET 2620L and EET 3710 and EET 3710L or EET 3725 and EET 3725L and MATH 1570 or MATH 1571.

**EET 3712L PLC Laboratory 1 s.h.**

Exercises in ladder logic programming for programmable logic controllers (PLCs) using concepts developed in EET 3712. Input/Output (I/O) concepts related to PLCs. Three hours per week. Concurrent with: EET 3712.

**EET 3715 Industrial Instrumentation and Control 3 s.h.**

Introduction to industrial instrumentation and process control. Application of calculus, thermodynamics, and fluid flow to instrumentation and control systems. Characteristics of sensing devices including temperature, pressure, flow, level, position, analytical, vibration, etc. Analog electronic instrumentation and instrument calibration. Concepts of closed loop control, process dynamics and loop tuning, feedforward, feedback, and cascade control in industrial process systems. 2 hours lecture, 3 hours lab per week.

**Prereq.:** (EET 3710 and EET 3710L and EET 2605 and EET 2605L and EET 2620 and EET 2620L) or (EET 3725 and EET 3725L) and CHEM 1515 and CHEM 1515L and PHYS 1501 and (MATH 1570 or MATH 1571) with letter grade of C or better.

**EET 3725 Electromechanical Systems 3 s.h.**

AC/DC circuit analysis techniques including network theorems, MultiSim computer circuit analysis with applications to AC/DC machinery, electronics, digital circuits and control systems. Three hours lecture per week. Concurrent with: EET 3725L.

**Prereq.:** C or better in MATH 1570.

**EET 3725L Electromechanical Systems Lab 1 s.h.**

Lab experiences to accompany EET 3725 Electromechanical Systems. Topics include lab safety, resistor color code, DC and AC circuits, oscilloscope and function generator, diode rectifiers, transistor switching circuits and amplifiers, three phase power measurements, transformer testing, DC and AC motor characteristics.

**Prereq.:** none.

**Coreq.:** EET 3725.

**EET 3730 Logic Systems Design 2 s.h.**

The characteristics and applications of integrated circuit logic families and various memory devices. Emphasis on the design of digital systems with SSI, MSI, and LSI as system components. Concurrent with: EET 3730L.

**Prereq.:** "C" or better in EET 2620 and EET 2620L and EET 2605 and EET 2605L and EET 1502 and EET 1502L and MATH 1570.

**EET 3730L Logic Systems Design Lab 1 s.h.**

Laboratory exercises dealing with applications of concepts developed in EET 3730. Three hours per week.

**Coreq.:** EET 3730.

**EET 3735 Microprocessor Architecture and Programming 2 s.h.**

An introduction to microprocessor architecture, memory organization, and input/output addressing. Emphasis on machine/assembly language programming to teach concepts of buses, machine cycles, and internal data flow. Two hours lecture per week.

**Prereq.:** "C" or better in CSIS 1590, or in EET 1501 and EET 1501L and EET 2620 and EET 2620L; "C" or better in either MATH 1513, or in either MATH 1510 or MATH 1510C and in either MATH 1511 or MATH 1511C.

**Coreq.:** EET 3735L.

**EET 3735L Microprocessor Architecture and Programming Laboratory 1 s.h.**

Laboratory exercises dealing with applications of concepts developed in EET 3735. Three hours per week.

**Coreq.:** EET 3735.

**EET 3745 Microprocessor Systems 2 2 s.h.**

Continuation of EET 3735 with emphasis on advanced programming techniques, memory mapping, I/O ports, and basic I/O interfacing. Two hours lecture per week.

**Prereq.:** "C" or better in EET 3735 and EET 3735L and EET 1502 and EET 1502L and MATH 1570.

**Coreq.:** EET 3745L.

**EET 3745L Microprocessor Systems 2 Lab 1 s.h.**

Laboratory exercises utilizing a microcomputer to provide practical applications of concepts developed in EET 3745. Three hours per week. Concurrent with: EET 3745.

**Prereq.:** Concurrent with EET 3745.

**EET 3760 Variable Speed Drives 2 s.h.**

Variable Speed Drive. Introduction to electronic speed control of direct and alternating current motors. Power conversion and waveform modulation techniques, drive sizing, harmonics, and motor performance. Concurrent with: EET 3760L.

**Prereq.:** "C" or better in EET 3710 and EET 3710L and EET 2605 and EET 2605L, EET 3700, and MATH 2670.

**EET 3760L Variable Speed Drives Lab 1 s.h.**

Exercises in variable speed drive applications, demonstrating the concepts developed in EET 3760. Three hours per week.

**Coreq.:** EET 3760.

**EET 3780 Communication Systems 2 s.h.**

Communication System. Audio signals, noise, untuned and RF amplifiers, amplitude, frequency, pulse modulation, transmission lines, antennas, and multiplexing of communication channels. Concurrent with: EET 3780L.

**Prereq.:** "C" or better in the following: EET 1502, EET 1502L, EET 2605, EET 2605L, EET 3700, and MATH 2670.

**EET 3780L Communication Systems Lab 1 s.h.**

Laboratory exercises dealing with application of concepts developed in EET 3780. Three hours per week. Concurrent with: EET 3780.

**Coreq.:** EET 3780.

**EET 4810 Electrical System Design 3 s.h.**

The design and layout of electrical systems for power, light, heat, signals, and communications in commercial, industrial, and residential buildings. Two hours lecture, three hours of lab per week.

**Prereq.:** EET 3710 and EET 3710L or EET 3725 and EET 3725L, with grade of C or better.

**EET 4812 Automation Systems Integration 3 s.h.**

Network technologies that support system integration of process/manufacturing automation, building automation (smart buildings), environment management, as well as energy management and electricity systems automation (smart grid systems). Hardware and software, including NetDDE, OPC, and SCADA Systems comprising the infrastructure of Industrial Internet of Things (IIoT) and Industry 4.0. IIoT infrastructure components such as Artificial Intelligence based control systems, wireless technology in automation systems, safety systems, and organizational approach to automation. Two hours lecture and three hours lab per week.

**Prereq.:** EET 3701 and EET 3760 and EET 3760L and EET 3745 and EET 3745L and CSIS 2610 and MATH 2670 and completion of one upper division technical elective with letter grade C or better.

**EET 4815 Power System Studies 3 s.h.**

Introduction to electrical power system studies including system modelling, load flow and voltage drop, short circuit, protective device coordination, motor transient starting, power quality, and arc flash calculations. Two hours lecture and three hours computational lab per week.

**Prereq.:** EET 3710 and EET 3710L and EET 3700 and MATH 2670 all with grades of "C" or better.

**EET 4820 Power System Protection and Control 2 s.h.**

Power System Protection Control. An introduction to electrical power system protection and control utilizing intelligent smart grid technologies. Topics include power system analysis, real time data acquisition and control, synchrophasor measurements, communications, and application of microprocessor-based protective relaying. Two hours lecture per week. Concurrent with: EET 4820L.

**Prereq.:** "C" or better in EET 3710 and EET 3710L and EET 3712 and EET 3712L, EET 3700 and MATH 2670.

**EET 4820L Power System Protection and Control Lab 1 s.h.**

Establishing communications, programming, and testing of various microprocessor based power system protective relays, including time-overcurrent, bus, differential, motor, distributed generation, and transformer relays. Three hours lab per week.

**Prereq.:** "C" or better in EET 3710 and EET 3710L and EET 3712 and EET 3712L.

**Coreq.:** EET 4820.

**EET 4845 Microprocessor Systems 3 2 s.h.**

Continuation of EET 3745 with emphasis on real data acquisition, A/D and D/A conversions, and industrial applications.

**Prereq.:** "C" or better in EET 3730 and EET 3730L and EET 3745 and EET 3745L and MATH 2670.

**Coreq.:** EET 4845L.

**EET 4845L Microprocessor Systems 3 Lab 1 s.h.**

Laboratory exercises utilizing a microcomputer to provide practical applications of concepts developed in EET 4845. Three hours per week.

**Coreq.:** EET 4845.

**EET 4850 Integrated Circuit Applications 2 s.h.**

Introduction to integrated circuits technology and typical application.

Concurrent with: EET 4850L.

**Prereq.:** "C" or better in EET 2605 and EET 2605L and EET 1502 and EET 1502L and MATH 2670.

**EET 4850L Integrated Circuit Applications Lab 1 s.h.**

Laboratory exercises dealing with the application of concepts developed in EET 4850. Three hours per week.

**Coreq.:** EET 4850.

**EET 4870 Process Control Technology 4 s.h.**

Interdisciplinary capstone course. Analysis and design of control systems for industrial processes, utility automation, and electromechanical systems. Includes preparation of schematic, control, and wiring diagrams; specifications, estimates, project schedule, and presentation of results. Three hours lecture, three hours lab per week.

**Prereq.:** Grades of C or better in EET 3712 and EET 3712L and EET 3760 and EET 3760L and EET 3701 and MATH 2670 and EET 4810 and two EET electives and Senior standing in EET and permission of EET program coordinator.

**EET 4890 Special Topics in EET 1-4 s.h.**

Special topics/new developments in electrical engineering technology. Subject matter, special prerequisites, and credit hours to be announced in advance of each offering. May be repeated with different subject matter to a maximum of 8 s.h.

**Prereq.:** Senior standing in EET or consent of the instructor.

**EET 4890A Special Topics in EET Process Control and Instrumentation 1-4 s.h.**

Special topics/new developments in electrical engineering technology. Subject matter, special prerequisites, and credit hours to be announced in advance of each offering. May be repeated with different subject matter to a maximum of 8 s.h.

**Prereq.:** Senior standing in EET or consent of the instructor.