

# ALL COURSES

## ELECTRICAL ENGINEERING

### **ELEG 4XXX: ELEG TRANSFER ELECTIVE**

Credit transferred from another institution and articulated for electrical engineering upper division elective.

### **ELEG 3XXX: ELEG TRANSFER ELECTIVE**

Credit transferred from another institution and articulated for electrical engineering upper division elective.

### **ELEG 1011: Introduction to Electrical Engineering**

Prerequisites: Math ACTE score of 24 or higher, or a grade of C or higher in MATH 1113 College Algebra, or MATH 1914 Precalculus, or MATH 1203 Plane Trigonometry, or consent of the instructor.

An introductory lecture/lab course to acquaint students with the fundamental techniques in the field of electrical engineering. Topics include technical aspects of electrical engineering including an introduction to computational techniques/software, basic introduction to computer-aided drafting (CAD), an introduction to programming, and basic circuit prototyping.

\$25 per credit hour curriculum content fee.

### **ELEG 2103: Electric Circuits I**

Prerequisite: MATH 2914 Calculus I and MATH 2924 Calculus II with a grade of C or better in each.

An introduction to circuit theory and electrical devices. Topics include resistive circuits, independent and dependent sources; analysis methods, network theorems; RC and RL first order circuits, and RLC second order circuits.

\$25 per credit hour curriculum content fee.

### **ELEG 2111: Electric Circuits Laboratory**

Prerequisite: ELEG 2103 Electric Circuits I

Report writing; use of basic electrical measurement devices; voltmeters, ammeters, R meters, wattmeters, and oscilloscopes. Computer modeling and data analysis of AC and DC circuits. Emphasis on developing laboratory techniques through experiments paralleling topics in ELEG 2103 Electric Circuits I and ELEG 2113 Electric Circuits II.

Laboratory three hours per week. \$40 laboratory fee. \$25 per credit hour curriculum content fee.

### **ELEG 2113: Electric Circuits II**

Prerequisites: ELEG 2103 Electric Circuits I and MATH 3243 Differential Equations I or consent of instructor

A continuation of ELEG 2103 Electric Circuits I covering phasor analysis, steady state power, complex network functions, frequency response, transformers, Laplace methods.

\$25 per credit hour curriculum content fee.

### **ELEG 2130: Digital Logic Design Lab**

Co-requisite: ELEG 2134 Digital Logic Design or consent of instructor

Laboratory must be taken during the same semester as the lecture, ELEG 2134 Digital Logic Design. A study of basic digital logic circuit design and implementation. Circuit schematic development utilizing computerized automated design tools. Computer modeling and simulation of digital systems. Emphasis will be placed on proper laboratory techniques, including data collection, data reduction, and report preparation.

Laboratory three hours. \$40 laboratory fee.

### **ELEG 2134: Digital Logic Design**

Prerequisite: ELEG 1011 Introduction to Electrical Engineering or COMS 2104

Co-requisites: ELEG 2130 Digital Logic Design Lab

Binary numbers and codes, Boolean algebra, combinational and sequential logic including: minimization techniques, memory systems, register transfers, control logic design, and state machines.

\$25 per credit hour curriculum content fee.

### **ELEG 3000: Engineering Internship/Research Experience**

Cross-listed: MCEG 3000 Engineering Internship/Research Experience

Offered: As needed

Prerequisite: A minimum of 60 hours applicable toward the ATU Electrical/Mechanical engineering program requirements with a minimum 3.5 GPA; and acceptance in an Engineering Internship or Research Experience for Undergraduates Program.

A minimum of six weeks of supervised on-the-job training with a university research program, engineering firm, manufacturer, municipality, or company employing engineers. A written report is required within one week of internship completion. Students will also present their internship experience to an engineering class or at a student engineering RSO meeting.

Note: Satisfies College of Distinction requirement.

### **ELEG 3003: Engineering Modeling and Design**

Cross-listed: MCEG 3003 Engineering Modeling and Design

Prerequisites: COMS 2104 or MCEG 2203 Computational Methods in Engineering and MATH 3243 Differential Equations I

Reduction of engineering systems to mathematical models; methods of analysis using computers; interpretation of numerical results; optimization of design variables. Examples are drawn from various engineering disciplines.

\$25 per credit hour curriculum content fee.

### **ELEG 3103: Electronics I**

Prerequisites: ELEG 2111 Electric Circuits Laboratory and ELEG 2113 Electric Circuits II

Physics and electrical characteristics of diodes, bipolar transistors, and field effect transistors, behavior of these devices as circuit elements; common electronic circuits in discrete and integrated form; digital circuits including standard IC gates and flip flops, linear circuits including standard discrete and integrated amplifier configurations and their characteristics.

\$25 per credit hour curriculum content fee.

### **ELEG 3123: Signals and Systems**

Prerequisites: MATH 3243 Differential Equations I and ELEG 2113 Electric Circuits II

Signal and system modeling, time and frequency domain analysis, singularity functions, the Dirac Delta function, impulse response, the superposition integral and convolution, Fourier series and Fourier and Laplace transformations.

\$25 per credit hour curriculum content fee.

### **ELEG 3133: Microprocessor Systems Design**

Prerequisites: ELEG 2134 Digital Logic Design and ELEG 2130 Digital Logic Design Lab

Digital design using microprocessors. Microcomputer architecture, memory structures, I/O interfaces, addressing modes, interrupts, assembler programming, and development tools. This course should also attract computer science students interested in hardware.

\$25 per credit hour curriculum content fee.

### **ELEG 3143: Electromagnetics**

Prerequisites: MATH 2934 Calculus III and PHYS 2124 Calculus-Based Physics II

An introduction to static and dynamic electromagnetic fields using vector methods. Transmission lines, electrostatic fields, magnetostatic fields, Maxwell's equations, plane electromagnetic wave propagation, reflection, refraction, attenuation, antennas, reciprocity, and gain.

\$25 per credit hour curriculum content fee.

### **ELEG 3153: Electrical Machines**

Prerequisite: ELEG 2113 Electric Circuits II

Steady state analysis of single phase and polyphase transformers, direct current machines, synchronous machines, induction machines, and special purpose machines. Special emphasis will be given to the modeling and control of these machines.

\$25 per credit hour curriculum content fee.

### **ELEG 3163: Electric Power Systems**

Prerequisites: ELEG 2113 Electric Circuits II and PHYS 2124 Calculus-Based Physics II

Introduction to power system analysis and operation. Topics included: mathematical modeling of power system components, power flow analysis, symmetric and asymmetric faults and economic operation of power systems.

\$25 per credit hour curriculum content fee.

### **ELEG 3173: Math Methods for Engineers**

Offered: Annually

Cross-listed: MATH 3173 Math Methods for Engineers

Prerequisite: MATH 3243 Differential Equations I

This course is designed to give the undergraduate student an introduction to a variety of advanced mathematical techniques used in solving engineering problems. The course will cover linear algebra, complex variables, discrete mathematics, and applied statistics.

\$25 per credit hour curriculum content fee.

### **ELEG 3203: Renewable Energy Technology**

Prerequisite: ELEG 2113 Electric Circuits II

An introduction and comprehensive overview of renewable energy technology. Topics include distributed generations and renewable energies including wind power, solar power, fuel cells and hydropower. Emphasis will be placed on basic concepts, operation principles and economics of existing and emerging renewable energy technologies.

\$25 per credit hour curriculum content fee.

### **ELEG 4103: Electronics II**

Prerequisite: ELEG 3103 Electronics I

A continuation of ELEG 3103 Electronics I specializing in characteristics and applications of both linear and digital integrated circuits; amplifiers, feedback analysis, frequency response, oscillators, amplifier stabilization, microprocessors, memory systems, emphasis on design.

\$25 per credit hour curriculum content fee.

### **ELEG 4113: Digital Signal Processing**

Prerequisites: ELEG 3123 Signals and Systems and ELEG(MCEG) 3003

The study of discrete-time signals and systems, convolution, correlation, z-transform, discrete-time Fourier transform, analysis and design of digital filters.

\$25 per credit hour curriculum content fee.

### **ELEG 4122: Electrical Systems Lab**

Offered: Spring

Prerequisite: ELEG 3103 Electronics I

The course presents advanced topics in electrical engineering system design. Topics include discrete components, ICs, PLCs, and data acquisition systems.

\$40 laboratory fee. \$25 per credit hour curriculum content fee.

### **ELEG 4133: Advanced Digital Design**

Prerequisite: ELEG 2134 Digital Logic Design

Principles of digital systems design and the use of hardware description languages (HDL) are targeted toward the development of programmable logic devices in this project oriented course. The basic tenets of HDL will be presented including design flow, structural and behavioral descriptions, data types, concurrent and sequential statements, processes, procedures, functions, and packages. Approximately one hour per week will be devoted to supervised project development.

\$25 per credit hour curriculum content fee.

### **ELEG 4143: Communication Systems I**

Prerequisite: ELEG 3123 Signals and Systems

An introduction to design and analysis of analog and digital communication systems. Amplitude and angle modulation and demodulation, bandwidth, frequency division multiplexing, sampling and pulse-code modulation, detection error statistics in digital communication.

\$25 per credit hour curriculum content fee.

### **ELEG 4153: Communication Systems II**

Prerequisite: ELEG 4143 Communication Systems I

Continuation of ELEG 4143 Communication Systems I. Design and analysis of analog and digital communication systems, taking into account the effects of noise. Random variables, random processes, analog and digital communication systems in the presence of noise.

\$25 per credit hour curriculum content fee.

### **ELEG 4191: Electrical Design Project I**

First of a two part sequence of courses to complete an independent or group project in electrical engineering design. Emphasis will be placed on designing an electrical system or subsystem with due regard for Safety, environmental concerns, reliability, longevity, ease of manufacture, maintainability, and cost effectiveness. A written and oral report are required.

\$25 per credit hour curriculum content fee.

### **ELEG 4192: Electrical Design Project II**

Prerequisite: ELEG 4191 Electrical Design Project I and MCEG/ELEG 4202 Engineering Design

Second of a two part sequence of courses to complete an independent or group project in electrical engineering design. Emphasis will be placed on designing an electrical system or subsystem with due regard for Safety, environmental concerns, reliability, longevity, ease of manufacture, maintainability, and cost effectiveness. A written and oral report are required.

\$50 course fee. \$25 per credit hour curriculum content fee.

### **ELEG 4202: Engineering Design**

Cross-listed: MCEG 4202 Engineering Design

Prerequisites: ELEG major, junior standing

This course serves as the first part of a two course sequence in which the student completes a senior design project. Design methodologies and tools including real world design considerations such as environmental impact, engineering ethics, economics, safety, product costing and liability are introduced. Design for manufacture, project management, scheduling and proposal writing will be covered. Successful completion of this course shall require completion of a proposal for a senior design project being accepted by the faculty design project review process.

\$25 per credit hour curriculum content fee.

### **ELEG 4303: Control Systems**

Prerequisites: ELEG (MCEG) 3003 and ELEG 2113 Electric Circuits II

An introduction to the field of control system engineering. Topics include: open and closed loop systems; mathematical modeling of electrical and mechanical systems; linearization; stability; block diagram reduction; signal flow graphs; transient analysis; stability analysis; root locus analysis; frequency analysis; and an introduction to compensator design.

\$25 per credit hour curriculum content fee.

**ELEG 4313: Modern Control Systems**

Prerequisite: ELEG 4303 Control Systems

A continuation of ELEG 4303 Control Systems Control Systems. Topics include: frequency response design, state space analysis, controllability, observability, state space design, robustness, and an introduction to digital control.

\$25 per credit hour curriculum content fee.

**ELEG 4951: Undergraduate Research in Electrical Engineering**

Offered: On demand

Prerequisite: Departmental approval

Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made.

\$25 per credit hour curriculum content fee.

**ELEG 4952: Undergraduate Research in Electrical Engineering**

Offered: On demand

Prerequisite: Departmental approval

Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made.

\$25 per credit hour curriculum content fee.

**ELEG 4953: Undergraduate Research in Electrical Engineering**

Offered: On demand

Prerequisite: Departmental approval

Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made.

\$25 per credit hour curriculum content fee.

**ELEG 4954: Undergraduate Research in Electrical Engineering**

Offered: On demand

Prerequisite: Departmental approval

Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made.

\$25 per credit hour curriculum content fee.

**ELEG 4991: Special Problems in Engineering**

Prerequisite: Minimum of three hours at the junior level in area of study.

Individual study in advanced area of the student's choice under the direction of a faculty advisor.

\$25 per credit hour curriculum content fee.

**ELEG 4992: Special Problems in Engineering**

Prerequisite: Minimum of three hours at the junior level in area of study.

Individual study in advanced area of the student's choice under the direction of a faculty advisor.

\$25 per credit hour curriculum content fee.

**ELEG 4993: Special Problems in Engineering**

Prerequisite: Minimum of three hours at the junior level in area of study.

Individual study in advanced area of the student's choice under the direction of a faculty advisor.

\$25 per credit hour curriculum content fee.

**ELEG 4994: Special Problems in Engineering**

Prerequisite: Minimum of three hours at the junior level in area of study.

Individual study in advanced area of the student's choice under the direction of a faculty advisor.

\$25 per credit hour curriculum content fee.