

ELEG COURSE DESCRIPTIONS

ELEG 1011. Introduction to Engineering, Computer Science and Technology. (1-0) Credit 1 hour. Introduction to basic engineering, computer science and technology concepts. Students will become aware of the various disciplines of engineering, computer science and technology, ethical and professional responsibilities in these fields, creativity and design. Co-requisite ELEG 1021 or equivalent course determined by department.

ELEG 1021. Introduction to Electrical Engineering Laboratory . (0-1) Credit 1 hour. The lab covers the manipulation, storage and transmission of information in electronic form. Topics will include time and frequency domain signals analysis, physics of basic building blocks of electrical systems, sampling, filtering and communications; digital imaging and storage technologies. Co-requisite ELEG 1011 or equivalent course determined by department.

ELEG 1043. Computer Applications in Engineering. (2-2) Credit 3 semester hours. C-Programming language; fundamentals, program looping, conditioning statements, arrays, functions, structures, character strings, pointers, preprocessors, input and output. Engineering problem solving using computers, use of engineering software and commercial packages. Prerequisite or co-requisite: MATH 1113. *(COSC 1300)

ELEG 2011. Electric Circuits Laboratory. (0-2) Credit 1 semester hour. Operation of basic laboratory-type test and measurement equipment. Experimentation in basic current voltage relations, circuit laws, and network analysis of linear DC and AC circuits. Use of oscilloscope in circuit analysis. RL, RC, RLC resonance, OP-Amp circuits, and transient circuit experimentation. Statistical analysis of elements of Electrical Circuits. Prerequisite: ELEG 1011, ELEG 1021, and ENGL 1143. Co-requisite: ELEG 2023.

ELEG 2023. Network Theory I. (3-0) Credit 3 semester hours. Study of basic circuit laws and theorems. Study of circuit analysis techniques, use of controlled sources, and transient and sinusoidal circuit analysis. Prerequisites PHYS 2511, PHYS 2521, PHYS 2523, MATH 2024, GNEG 1011, and GNEG 2021; Prerequisite or co-requisite: MATH 2043.

ELEG 2053. Introduction to Electrical Engineering. (3-0) Credit 3 semester hours. Introductory course for non-majors. Basic circuit theory, analysis of DC circuits; transient analysis of RLC circuits; steady state analysis; transformers; dc machines and induction motors; diode circuits; operational amplifiers; numbering systems, logic gates and combinational circuits. Prerequisite: PHYS 2511, PHYS 2521, PHYS 2523; Corequisite or prerequisite: MATH 2043, GNEG 1011, and GNEG 2021 and Prerequisite: MATH 2043.

ELEG 2083. Introduction to Digital Signal Processing (DSP) Solutions. (2-2) Credit 3 semester hours. Introduction to signal processing for discrete-time and continuous-time signals. Survey of filtering techniques. Basic principle of frequency response, Fourier Transform and Z transform. Basic principles of computer-based signal processing. Prerequisite: ELEG 1043

ELEG 2313. The Digital Information Age. (3-0) Credit 3 semester hours. Introductory course for non-engineering majors. Introduction to the ideas and principles of digital information systems. The topics include digital sensors, digitizing analog signals, digital logic, computers,

information coding, transmission and manipulation. Applications include digital scales, air-bag inflation systems, smart cards, bar-code scanners, digital cellular telephony, and modems. Prerequisites: MATH 1113 or equivalent

ELEG 3013. Network Theory II. (3-0) Credit 3 semester hours. Continuation of transient and sinusoidal analysis. Study of average and RMS power, polyphase circuits, complex frequency, frequency response, and magnetic circuits. Prerequisite: ELEG 2023, and MATH 2043.

ELEG 3021. Logic Circuits Laboratory. (0-3) Credit 1 semester hour. Experimentation in combinational and sequential logic circuitry. Design of counters, adders, digital display circuitry, shift registers, and control logic. Prerequisite or corequisite: ELEG 3063.

ELEG 3023. Signals and Systems. (3-0) Credit 3 semester hours. Basic discrete and continuous time signals, properties of systems, linear time invariant systems, Fourier analysis, z-transformers, LaPlace Transform. Prerequisite: ELEG 3013.

ELEG 3033. Physical Electronics. Principles of Solid State Devices . (3-0) Credit 3 semester hours. Crystal structure, introduction to quantum concepts and discrete energy levels; atomic bonding; phase relationships and kinetics. Band, solid-state band theory, Fermi-Dirac Statistics; conduction statistics, charge carrier transport, and introduction to semiconductor device physics. Introduction to MOS fabrication and design operation. Prerequisites: PHYS 2023, 2511, PHYS 2521, PHYS 2523, GNEG 1121, GNEG 2021, CHEM 1033, 1021, CHEM 1021 and MATH 2024; Prerequisite or co-requisite: MATH 2043.

ELEG 3041. Microelectronic Processing and Characterization Lab. (0-2) Credit 1 semester hour. Basic processes of microelectronic fabrication; doping, oxidation, photolithography, etching, metallization and clean room practices. Basic materials and device characterization. Prerequisite or co-requisite: ELEG 3033.

ELEG 3043. Electronics I. (3-0) Credit 3 semester hours. Operational amplifiers. Diodes and nonlinear circuits. Field effect transistors. Analysis and design of linear amplifiers. Biasing, small and large signal behavior. Operation of bipolar junction transistors. Prerequisite or co-requisite: ELEG 3033 and Prerequisite: ELEG 3013.

ELEG 3063. Logic Circuits (3,0) Credit 3 semester hours. Number systems and codes. Boolean algebra and logic minimization methods. Combinational and sequential design using logic gates and flip flops. Computer-aided design tools for digital design, simulation, and testing. Prerequisite: ELEG 2023.

ELEG 3071. Microprocessor Systems Design Laboratory (0-3) Credit 1 semester hours. Software and hardware experiments with a microcomputer system. Assembly language and C programming, simple input/output interfacing, and interrupt processing in microcomputer systems. Prerequisite: ELEG 3063, and Co-requisite: ELEG 3073 and ELEG 3021.

ELEG 3073. Microprocessor Systems Design (3-0) Credit 3 semester hours.

Introduction to architecture, operation, and application of microprocessors; microprocessor programming; address decoding; system timing; parallel, serial, and analog I/O; interrupts and direct memory access; interfacing to static and dynamic RAM; microcontrollers. Introduction to Microcomputers. Prerequisites: ELEG 1043 and ELEG 3063. Co-requisite: ELEG 3071.

ELEG 3156. Engineering Internship I. (0-0) Credit 6 semester hours. An internship program or work experience with an approved engineering firm or engineering oriented business agency, planning, public service agency, or consulting firm, providing an introduction to the profession. Prerequisite: approval by the chairman of the department.

ELEG 4003. Communication Theory. (3-0) Credit 3 semester hours, Signals and spectra. Transmission and processing of signals. Continuous-wave modulation and pulse modulation. Baseband pulse transmission and passband digital transmission. Signal space analysis. Information measures. Prerequisites: ELEG 3023 and MATH 3685.

ELEG 4011. Electronics Laboratory. (0-3) Credit 1 semester hour. Applications of semiconductors diodes. Operational characteristics of transistor amplifiers (inverters, emitter follower, difference, etc.) FET characteristics and applications. Operational amplifier characteristics and circuit implementation. Frequency response of amplifiers. Prerequisite: ELEG 2011, Prerequisite or co-requisite: ELEG 3043

ELEG 4013. Electromechanical Energy Conversion. (3-0) Credit 3 semester hours. Electric and magnetic devices, force and torque measurements, iron core transformers, single phase and polyphase power circuit analysis. Introduction to per unit system. Prerequisites: MATH 3685 and ELEG 3013.

ELEG 4021. Power Laboratory. (0-3) Credit 1 semester hour. Operational characteristics of DC and AC machines; power circuit analysis. Prerequisite or corequisite: ELEG 4013.

ELEG 4023. Power Systems Engineering. (3-0) Credit 3 semester hours. Elementary synchronous machines. General considerations of power generation, transmission, distribution and utilization, survey of load flow, faults, transient stability and economic power dispatch. Prerequisite: ELEG 4013.

ELEG 4031. Communications Lab. (0-3) Credit 1 semester hour. Laboratory practice of communications theory, AM and FM modulation, transmission and reception. Analysis of signals and effect of noise interference on communications. Prerequisite or co-requisite: ELEG 4003.

ELEG 4033. Electromagnetic Field Theory I. (3-0) Credit 3 semester hours. Review of relevant mathematics, electricity, and magnetism. Study of dielectrics, Poisson's and Laplace's equations, magnetic flux, magnetic fields, and magnetic boundary conditions, Ampere's Circuital law, time varying fields and Maxwell's equations. Prerequisites: ELEG 2023 and MATH 3685.

ELEG 4043. Electronics II. (3-0) Credit 3 semester hours. Design and analysis of single and multistage transistor amplifiers, difference amplifiers, frequency response of amplifiers.

Feedback concepts. Analysis and design using discrete and integrated devices. Prerequisite: ELEG 3043.

ELEG 4053. Digital Signal Processing. (3-0) Credit 3 semester hours, Introduction, review of signals and systems, sampling and z-transforms, discrete Fourier transform, fast Fourier transform, non-recursive filter design, recursive filter design. Use of Matlab and DSP's in signal analysis. Prerequisite: ELEG 3023.

ELEG 4073. Servomechanism and Control Systems. (3-0) Credit 3 semester hours. Model of physical systems, system responses, system characteristics, stability design, frequency response analysis and design, discrete -time systems. Prerequisites: ELEG 3023 and MATH 3685.

ELEG 4103. Special Topics. (3-0) Credit 3 semester hours. Selected current and emerging topics in Electrical Engineering. Courses may be repeated for credit when topics vary. Prerequisite: Consent of advisor

ELEG 4151. Digital Signal Processing (DSP) Solutions Lab. (0-3) Credit 1 semester hour. DSP studies using a Computer-Based Approach. Discrete-Time Signals in the Time-Domain, Discrete-Time Systems in the Time-Domain, Discrete-Time signals in the Frequency-Domain, LTI Discrete-Time Systems in the Frequency-domain, Digital Processing of Continuous-Time Signals, Digital Filter Structures, Design, and implementation, Analysis of Finite Word-Length Effects, Multirate DSP, and Adv. Projects. Co-requisite: ELEG 4053 or ELEG 4163

ELEG 4156. Engineering Internship II. (0-0) Credit 6 semester hours. An internship program or work experience with an approved engineering firm or engineering oriented business agency, planning agency, public service agency, or consulting firm which provides an introduction to the profession. Prerequisite: approval by the chairman of the department.

ELEG 4163. Digital Signal Processing (DSP) Design and Testing Techniques. (3-0) Credit 3 semester hours. Fundamental techniques of Digital Signal Processing design, algorithm development, system simulation, real-time prototype of DSP systems. Fundamental techniques of DSP testing, DSP software, hardware and different DSP applications. Co-requisite: ELEG 4053.

ELEG 4223. Electronic and Photonic Materials and Devices. (3-0) Credit 3 semester hours. Properties of insulators, conductors, semiconductors, electro-optical and magnetic materials. Basic operation of opto-electronic devices and systems. Prerequisite: ELEG 3033

ELEG 4243. Power Electronics. (3-0) Credit 3 semester hours. Characteristics of solid state power switches, controlled rectifiers and inverters; DC choppers; AC power controllers; applications to power supplies, electric machine drives, HVDC power transmission and space power systems. Prerequisite: ELEG 3043; Prerequisite or corequisite: ELEG 4013.

ELEG 4253 Embedded Systems Design (3-0) Credit 3 semester hours. Microprocessor and microcomputer structures and applications; programming and design of hardware interfaces; emphasis on student projects. Prerequisites: ELEG 3071 and ELEG 3073.

ELEG 4263. VLSI Circuit Design. (3-0) Credit 3 semester hours. Analysis and design of monolithic integrated circuits, device modeling; CAD tools and computer-aided design, design methodologies of VLSI circuits. Prerequisite: ELEG 3043, 3063; Prerequisite or co-requisite: ELEG 4043

ELEG 4273. Analog and Mixed Signal Techniques I. (3-0) Credit 3 semester hours. Overview of analog and digital logic circuits, mixed signal circuits and systems, mixed signal test specification process, DC and parametric measurements, tester hardware, DSP-based testing, simulation and design techniques, power management circuits and systems. Prerequisites: ELEG 3043 and ELEG 3063. Co-requisite: ELEG 4003

ELEG 4283. Reliability Analysis of Electrical Facilities. (2.5-1) Credit 3 semester hours. Overview of reliability and probabilistic theory, Monte Carlo simulations, preventive and predictive maintenance methodology, computerized maintenance management systems, generation, transmission and distribution networks and loads, field study and power deregulation. Prerequisites: MATH 3685 and ELEG 4013

ELEG 4291. Mixed Signal Testing Techniques Lab. (0-3) Credit 3 semester hours. Mixed signal Measurements, Mixed signal Parameters Measurements, Signal sourcing Techniques, Signal capturing Techniques, Frequency Domain Measurements, DSP based testing, DAC testing, ADC testing, Template test and Analog Circuit Review. Corequisite: ELEG 4273

ELEG 4293. Analog and Mixed Signal Techniques II. (3-0) Credit 3 semester hours. Sampled channel testing. Focused calibrations, DAC testing, ADC testing, DIB design. Design for test (DFT), Data Analysis and Test Economics. Current issues relating to Mixed Signal Systems. Prerequisite: ELEG 4273

ELEG 4303. Digital System Design. (3-0) Credit 3 semester hours. The use of hardware description language and automated synthesis in design. Hierarchical and modular design of digital systems. Control logic, synchronous and asynchronous sequential circuit design. Programmable logic devices and field programmable gate arrays. Circuit simulation for design verification and analysis. Timing-oriented design. Prerequisites: ELEG 3063 and ELEG 3073.

ELEG 4311. Advanced Logic Design Laboratory (0-3) Credit 1 semester hour. Design and laboratory implementation of digital systems using standard, integrated circuits. Corequisite: ELEG 4313.

ELEG 4313. Broadband Communication Systems I. (3-0) Credit 3 semester hours. Introduction to types of high-speed communication system (broadband), telephone subscriber loop environment, twisted-pair channel modeling, transceiver front-end noise models. Channel capacity testing and analysis techniques of XDSL systems. XDSL modulation techniques and deployment considerations. Prerequisites: ELEG 3023

ELEG 4321. Computer Network Laboratory. (0-2) Credit 1 semester hour. Use of Linux. Shell and socket programming, Client and server operations, wireshark software for performance

monitoring, management and traffic parameters estimation, wireless local area network. Address resolution protocol and troubleshooting. Internet protocols, routing, and fragmentation. Co-requisite: ELEG 4333.

ELEG 4323. Broadband Communication Systems II. (3-0) Credit 3 semester hours.

Topics include Hybrid Circuits, Analog Front end precision issues, channel equalization, Echo cancellation, Error Correction and Trellis Coding. Varieties of Digital Subscriber Line (XDSL), testing issues relating to XDSLs. Standards and standard related issues with emphasis on Asymmetric Digital Subscriber Line. Prerequisite: 4313

ELEG 4333. Computer Networks (3-0) Credit 3 semester hours. Multi-service applications: Voice/IP, Video on-demand and Video Conferencing. Physical layer design issues including the modulation, demodulation, synchronization, bandwidth, SNR, and interfaces. Link layer design including medium access control, error detection and retransmission strategies. Network routing strategies and transport layer functionality. Design of wired and wireless Local Area Networks based on IEEE 802.x standards. Design of INTERNET Architectures configured with network routing, and the use of network components such as routers, switches and hubs. Prerequisite: ELEG 4303.

ELEG 4343. Microcontroller Applications (3-0) Credit 3 semester hours. Use and application of single chip microcontrollers in the design of instrumentation and control systems. Prerequisite: ELEG 3043 and ELEG 4303.

ELEG 4353. Advanced Logic Design (3-0) Credit 3 semester hours. Introduction to the design, modeling and verification of complex digital system, modem design, methodologies for logic design, development of tools for the design and testing of digital systems. Prerequisite: ELEG 3073, Co-requisite: ELEG 4311

ELEG 4393. Computer Architecture and Organization (3-0) Credit 3 semester hours. An introduction to computer organization using assembly and machine language. Number representation, computer arithmetic, instruction sets, I/O interrupts, and programming interrupts. Projects involve detailed study and use of a specific computer hardware and software system. Prerequisite: ELEG 3063

ELEG 4473. Senior Design and Professionalism I. (1-4) Credit 3 semester hours. This is the first course of a two-semester capstone design experience (ELEG 4483 must immediately follow ELEG 4473 or sequence must restart with ELEG 4473) involving engineering design of an industrial or advanced team project. Elements of ethics of ethics and professionalism in engineering practice are integrated into the project experience. The design achievement project will include application of relevant engineering codes and standards, as well as realistic constraints. Design achievements are demonstrated by with written report, oral presentation, and professional standards reports and ethics examinations and oral presentations. Prerequisites: ELEG 2011, CHEG 2003, ELEG 3063, ELEG 3043, and senior standing. Course equivalence: CHEG, CVEG or MCEG 4473. COMM 1003.

ELEG 4483. Senior Design and Professionalism II. (1-4) Credit 3 semester hours. A continuation of ELEG 4473 with required design modifications of the team projects necessary to produce a working prototype of the designs initiated in Senior Design and Professionalism I. Results of the design are presented in a Design project deliverables include an oral presentation, a written report, and a formal, final, oral presentation, as well a final report. Professionalism education will demonstration of prototype, or model, of the design, Elements of professionalism reinforce the importance of professional engineering ethics, corporate culture, life-long learning, and globalization. Prerequisite: ELEG 4473. Course equivalence: CHEG, CVEG or MCEG 4483. ELEG 4483 must immediately follow ELEG 4473 or sequence must restart with ELEG 4473.

ELEG 4991-4992-4993. Independent Study. (1-0, 2-0, 3-0) Credit 1, 2, or 3 semester hours. Readings, research, and/or field work on selected topics. Prerequisite: consent of advisor.