

Electrical Engineering (ELEC)

ELEC 220 Circuits 3 Credits (3,0)

Introduction of the fundamentals of electrical engineering. Circuit theory and variables. Voltage-current relationship for passive elements. Circuit analysis and network solutions. Phasors and frequency domain analysis. Transient analysis of first and second order systems. Equivalent circuits and power.

Prerequisites: COMM 221 and MATH 345 and PHYS 250 and PHYS 250W

Corequisites: ELEC 220L

Course Offered at: Worldwide, Asia

ELEC 220L Circuits Laboratory 1 Credit (0,1)

Lab experiments using resistors, inductors, capacitors, operational amplifiers, and DC and AC sources. Hardware and Software circuit simulations will be used.

Corequisites: ELEC 220

Course Offered at: Worldwide, Asia

ELEC 223 Linear Circuits Analysis I 3 Credits (3,0)

Passive circuit elements, resistive networks, circuit simplification. Kirchhoff's laws. Linear network theorems. Transient response of RC, RL, and RLC circuits. Steady-state analysis for sinusoidal sources.

Prerequisites: MATH 345 and PHYS 250

Corequisites: ELEC 223L

Course Offered at: Daytona Beach, Prescott

ELEC 223L Electrical Engineering Laboratory I 1 Credit (0,3)

Circuit experimentation, electrical instrumentation and measurement, based on working knowledge of electronic test equipment. Interpretation of measurement data.

Corequisites: ELEC 223

Course Offered at: Daytona Beach, Prescott

ELEC 230 Electronics 3 Credits (3,0)

Diodes, transistors, amplifiers, operational amplifiers, and integrated circuits. Biasing and DC analysis.

Prerequisites: ELEC 220 and ELEC 220L

Corequisites: ELEC 230L

Course Offered at: Worldwide, Asia

ELEC 230L Electronics Laboratory 1 Credit (0,1)

Lab experiments using diodes, transistors, and amplifiers. Design of rectifiers, biasing networks, and small-signal amplifiers.

Corequisites: ELEC 230

Course Offered at: Worldwide, Asia

ELEC 240 Survey of Electronics, Software and Control Systems 3 Credits (3,0)

Basics of electronics, software, and control systems. Understanding of linear and digital systems for UAS majors.

Course Offered at: Prescott

ELEC 299 Special Topics in Electrical Engineering 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in electrical engineering

Course Offered at: Daytona Beach, Prescott, Worldwide

ELEC 300 Linear Circuits Analysis II 3 Credits (3,0)

Laplace and Fourier transforms, resonance, Bode diagrams, two-port networks.

Prerequisites: ELEC 223

Course Offered at: Daytona Beach, Prescott

ELEC 302 Electronic Devices and Circuits 3 Credits (3,0)

Semiconductor device characteristics. Analysis and design of amplifiers, single-stage and multi-stage amplifier circuits.

Daytona Beach Prerequisites: ELEC 223

Daytona Beach Corequisites: ELEC 302L

Prescott Prerequisites: EE students must have C or better in ELEC 223

Prescott Corequisites: ELEC 302L

Course Offered at: Daytona Beach, Prescott

ELEC 302L Electronic Circuits Laboratory 1 Credit (0,3)

Laboratory experiments in the measurement of electronic device characteristics; design of biasing networks, small signal amplifiers, and switching circuits.

Corequisites: ELEC 302

Course Offered at: Daytona Beach, Prescott

ELEC 307 Avionics I 3 Credits (3,0)

Basic principles and physics of avionics; evolution of avionic systems from inception to the latest technology; requirements, techniques, and standardization of avionics and regulatory bodies. Principles of satellite and performance-based navigations; geodetics; terrain aware landing systems; air traffic control; tracking and anticollision systems; data buses and cybersecurity.

Course Offered at: Daytona Beach

ELEC 308 Introduction to Electrical Communications 3 Credits (3,0)

Fourier analysis of periodic and non-periodic signals. Basic operations in generating, modulating, and transmitting signals. Various modulation schemes, including double-sideband suppressed carrier amplitude modulation, single-sideband amplitude modulation, frequency modulation, and phase modulation. Demodulation of modulated signals.

Prerequisites: CESC 315

Course Offered at: Daytona Beach

ELEC 311 Robotics and Autonomous Systems I 3 Credits (3,0)

Fundamentals of robotic and uncrewed systems; uncrewed system terminology; operating principles of common robot sensors; localization strategies and sensors; active ranging technologies and use cases; cameras and computer vision; autonomous behaviors and strategies.

Prescott Prerequisites: CPSC 125 or CPSC 223

Course Offered at: Daytona Beach, Prescott

ELEC 314 Signal and Linear System Analysis 3 Credits (3,0)

Signals and systems; convolution; continuous time signals; time-domain and spectral analysis of continuous time signals; Laplace transforms; discrete time signals; time-domain and spectral analysis of discrete time signals; Z-transform.

Prerequisites: CE/EE majors must have C or better in ELEC 223 and MATH 345

Corequisites: ELEC 314L

Course Offered at: Prescott

ELEC 314L Signal and Linear System Analysis Laboratory 1 Credit (0,1)

Laboratory support for signal and linear system analysis.

Corequisites: ELEC 314

Course Offered at: Prescott

ELEC 327 Electrical Engineering Fundamentals 3 Credits (3,0)

Circuit theory and variables; Ohm's and Kirchhoff's laws; nodal and mesh analysis; source transformation; Wheatstone bridge; transient analysis; phasors and steady-state AC analysis; filter concepts.

Daytona Beach Prerequisites: COMM 221 and PHYS 250 and PHYS 250L

Daytona Beach Corequisites: ELEC 327L and MATH 345

Prescott Prerequisites: COMM 221 and PHYS 250 and PHYS 250L

Worldwide Prerequisites: COMM 221 and PHYS 250 and PHYS 250W and MATH 345

Course Offered at: Daytona Beach, Prescott, Worldwide

ELEC 327L Electrical Engineering Fundamentals Laboratory 1 Credit (0,3)

Experiments in electrical engineering fundamentals; circuit theory, analysis techniques, and verification of theoretical models.

Prerequisites: PHYS 250L

Corequisites: ELEC 327

Course Offered at: Daytona Beach, Prescott

ELEC 334 Electrical Engineering for Mechanical Engineers 3 Credits (3,0)

Electrical engineering topics relevant to mechanical engineers. Electric machinery, signal conditioning, power distribution, digital circuits, and microcontrollers.

Prerequisites: ELEC 223 or ELEC 335

Course Offered at: Prescott

ELEC 335 Electrical Engineering I 2 Credits (2,0)

Circuit theory, voltage-current relationships for passive elements, network solutions. Phasors, frequency-domain analysis, transient analysis of first and second-order systems, design simple passive and active circuits.

Prescott Corequisites: MATH 345 and PHYS 250 and ELEC 335L

Course Offered at: Daytona Beach, Prescott

ELEC 335L Electrical Engineering I Laboratory 1 Credit (0,3)

Lab experiments with resistors, inductors, capacitors, operational amplifiers, and DC/AC sources. Circuit simulations using hardware and software tools.

Prescott Corequisites: ELEC 335

Course Offered at: Prescott

ELEC 340 Electric and Magnetic Fields 3 Credits (3,0)

Study of time-varying electromagnetic fields. Electrostatics and magnetostatics. Magnetic and dielectric material properties. Maxwell's equations. Energy radiation of plane waves. Introduction to electromagnetic waves, transmission lines, the Smith chart, and antenna radiation.

Daytona Beach Prerequisites: ELEC 223 and MATH 441 and PHYS 250

Prescott Prerequisites: EE majors must have C or better in MATH 441 and PHYS 250

Course Offered at: Daytona Beach, Prescott

ELEC 399 Special Topics in Electrical Engineering 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in electrical engineering.

Course Offered at: Daytona Beach, Prescott

ELEC 401 Control Systems Analysis and Design 3 Credits (3,0)

Modeling, analysis, and design of linear control systems. Feedback control characteristics, performance analysis, Z-transforms, stability, and controller design.

Daytona Beach Prerequisites: MATH 345 and ELEC 300

Daytona Beach Corequisites: ELEC 401L

Prescott Prerequisites: CE/EE majors must have C or better in ELEC 314 and ELEC 314L

Prescott Corequisites: ELEC 401L

Course Offered at: Daytona Beach, Prescott

ELEC 401L Control Systems Laboratory 1 Credit (0,3)

Laboratory experiments in linear control systems. Hands-on experiments to support control theory and design.

Corequisites: ELEC 401

Course Offered at: Daytona Beach, Prescott

ELEC 410 Communication Systems 3 Credits (3,1)

Theory and application of electronic communication systems; spectral analysis; modulation and demodulation techniques; transmitting and receiving systems; noise in receivers and transmitters; avionic radio systems including NAV, COMM, DME, ATCRBS, ILS.

Prescott Prerequisites: EE majors must have a C or better in ELEC 314 and ELEC 314L, ELEC 340 and MATH 412

Corequisites: ELEC 410L

Course Offered at: Daytona Beach, Prescott

ELEC 410L Communication Systems**Laboratory 1 Credit (0,3)**

Design and analysis of communication circuits; performance characteristics and limitations of communication components and systems; laboratory experiments.

Prescott Corequisites: ELEC 410

Course Offered at: Daytona Beach, Prescott

ELEC 417 Digital Communications 3 Credits (3,0)

Digital codes and their generation. Advantages and disadvantages of various code types. Bandwidth considerations. Inter-symbol interference, bit error rates, and distortion phenomena. Constellation diagrams. Wideband modulations. Wireless computer networks, cellular networks. Wireless security.

Daytona Beach Prerequisites: ELEC 308 or ELEC 410

Course Offered at: Daytona Beach

ELEC 424 Wireless Communication Systems 3 Credits (3,0)

Principles and practices of wireless communication systems; terrestrial cellular technologies; mobile radio propagation models; capacity of fading wireless channels; digital modulation in fading channels; wireless link quality enhancement techniques; MIMO systems; multiple access techniques such as TDMA, FDMA, CDMA, OFDMA; wireless systems and standards for terrestrial and satellite systems.

Prerequisites: ELEC 314 and ELEC 314L and MATH 412

Corequisites: ELEC 424L

Course Offered at: Prescott

ELEC 424L Wireless Communication Systems**Laboratory 1 Credit (0,3)**

Performance characterization of fading in wireless transmission systems; high-speed wireless transmission techniques using MIMO and OFDM; MATLAB simulation of wireless systems.

Corequisites: ELEC 424

Course Offered at: Prescott

ELEC 426 Robotics and Autonomous Systems II 3 Credits (3,0)

Advanced knowledge and practical experience in the development and control of robotic platforms and autonomous systems; applications of Robotics and autonomous systems in areas such as manufacturing, transportation, defense, aviation and aerospace systems.

Prerequisites: ELEC 311

Corequisites: ELEC 426L

Course Offered at: Prescott

ELEC 426L Robotics and Autonomous Systems II**Laboratory 1 Credit (0,3)**

Implementation of Robots and autonomous systems by integrating sensors and actuators and using microcontrollers to operate them.

Prerequisites: ELEC 311

Corequisites: ELEC 426

Course Offered at: Prescott

ELEC 430 Introduction to Radio Frequency**Circuits 3 Credits (3,0)**

Radio frequency (RF) theory and circuits. RF behavior of common devices, transmission lines, Smith chart, impedance matching, and S parameters. Analysis, design, and simulate RF circuits including filters, amplifiers, couplers, matching networks, and mixers.

Prerequisites: ELEC 302 and ELEC 340

Corequisites: ELEC 430L

Course Offered at: Daytona Beach

ELEC 430L Radio Frequency Circuits**Laboratory 1 Credit (0,3)**

Laboratory accompanying radio frequency (RF) circuits. Operation of RF measurement equipment. Demonstration of RF behavior in common devices. Measurement OF transmission line parameters, S-parameters of transistors, and integrated circuits. Impedance matching. Design and testing of filters, amplifiers, oscillators, and mixers.

Corequisites: ELEC 430

Course Offered at: Daytona Beach

ELEC 440 Modern Navigation Systems; Theory and Practice 3 Credits (3,0)

Coordinate frames, transformations, basic earth models; position fixing sensors such as GPS; dead reckoning sensors; estimation of position, velocity, attitude using Kalman filtering; practical projects.

Prerequisites: ELEC 401 or AERO 430 and MATH 412

Course Offered at: Prescott

ELEC 450 Elements of Power Systems 3 Credits (3,0)

Electrical power conversion and control; use of electronic devices as switches; power computations; single and three-phase power distribution; transformers; controlled and uncontrolled rectification; AC voltage controllers, DC-DC converters, DC power supplies, DC-AC inverters, resonant converters.

Prescott Prerequisites: EE majors must have C or better in ELEC 302 and ELEC 401

Corequisites: ELEC 450L

Course Offered at: Prescott

ELEC 450L Power Systems Laboratory 1 Credit (0,3)

Electrical power conversion and control; electronic devices as switches; power computations; rectification; AC voltage controllers, DC-DC converters, DC power supplies, DC-AC inverters, resonant converters.

Corequisites: ELEC 450

Course Offered at: Prescott

ELEC 460 Advanced Control and System**Integration 3 Credits (3,0)**

State variables, controllability, observability; modern design techniques; Modelling in the discrete time domain; design project.

Prerequisites: C or better in ELEC 401 or AERO 430

Course Offered at: Prescott

ELEC 490 Electrical Engineering Capstone I 3

Credits (3,0)

Participate in a two-semester multidisciplinary capstone design course; engage in requirements gathering, team management, analysis, design, implementation, and testing of software/hardware systems; collaborate in teams using defined processes for product development; assess project work with industrial standards and review techniques; emphasize skills for effective participation in engineering development teams in industrial environments.

Daytona Beach Prerequisites: Senior standing

Prescott Prerequisites: EE majors must have C or better in CESC 320 and CESC 320L and ELEC 401 or AERO 430

Prescott Corequisites: ELEC 410 and ELEC 450

Course Offered at: Daytona Beach, Prescott

ELEC 491 Electrical Engineering Capstone II 3

Credits (3,0)

Participate in a two-semester multidisciplinary capstone design course; engage in requirements gathering, team management, analysis, design, implementation, and testing of software/hardware systems; collaborate in teams using defined processes for product development; assess project work with industrial standards and review techniques; emphasize skills for effective participation in engineering development teams in industrial environments.

Daytona Beach Prerequisites: ELEC 490

Prescott Prerequisites: EE majors must have C or better in ELEC 490

Course Offered at: Daytona Beach, Prescott

ELEC 499 Special Topics in Electrical

Engineering 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in electrical engineering.

Course Offered at: Daytona Beach, Prescott