

EDSP 6320. Computing Applications for Special Populations. 3 hours. Focus on instructive and adaptive applications of computer technology to the educational and life needs of individuals with exceptional learning, cognitive and/or behavioral characteristics. Issues related to equity and accessibility are discussed. Prerequisite(s): consent of department.

EDSP 6410. Theoretical Issues in Learning Disabilities. 3 hours. Analysis of the theoretical issues surrounding a life-span approach to learning disabilities. Emphasis is on the cognitive, social and neuropsychological research applicable to learning disabilities. Educational implications of the research also are addressed.

EDSP 6440. Research Issues in Special Education. 3 hours. Analysis of current research issues and problems unique to exceptional populations. Content includes design, methodology and statistical topics. Prerequisite(s): EDSP 6270, EDSP 6310, EDSP 6410; EPSY 6010 and EPSY 6210, or consent of department.

EDSP 6800. Topics in Special Education. 3 hours. Organized seminars designed to accommodate the needs of post-master's level students and the demands of program development that are not met by regular course offerings. Examples of topics that may be covered include: issues related to aggression and violence; implications for prevention and treatments; and strategies to address the needs of diverse learners with special needs and their families. Short courses and special seminars on specific topics organized on a limited-offering basis. May be repeated for credit.

EDSP 6900-EDSP 6910. Special Problems. 1–3 hours each. Research by doctoral students in fields of special interest. Includes project research studies and intensive reading programs. Conferences with professors in the fields also are included.

EDSP 6950. Doctoral Dissertation. 3, 6 or 9 hours. To be scheduled only with consent of department. 12 hours credit required. No credit assigned until dissertation has been completed and filed with the graduate dean. Doctoral students must maintain continuous enrollment in this course subsequent to passing qualifying examination for admission to candidacy. May be repeated for credit.

Special Education Courses Offered at Texas Woman's University

Students wishing to enroll in the following TWU courses will do so through a cross-registration mechanism administered by the School of Graduate Studies at UNT.

EDUC 6023. Practicum in Assessment and Evaluation of Individuals with Disabilities. Required of all doctoral students in special education; administration and interpretation of educational, communicative, audiological and psychological tests given to individuals with disabilities. 7 laboratory hours a week. Prerequisite(s): proficiency in tests and measurements and permission of instructor. May be repeated for credit.

EDUC 6103. Social, Psychological and Educational Aspects of Mental Retardation and Developmental Disabilities. Advanced study of etiology, remediation and education of individuals with mental retardation and developmental disabilities. 3 lecture hours a week. Prerequisite(s): EDUC 5103 or equivalent courses in the area and permission of instructor.

EDUC 6333. Seminar in Emotional and Behavioral Disorders. Study of adjustment and emotional problems in individuals assigned to various least restrictive environments. Research related to etiology, conceptual models and interventions. 3 lecture hours a week. Prerequisite(s): EDUC 5303 or equivalent courses and permission of instructor.

EDUC 6403. Seminar in Learning Disabilities. Advanced study of physical, psychological and environmental causes of learning disabilities, and interrelationships among the causes. 3 lecture hours a week. Prerequisite(s): EDUC 5443 or equivalent courses in the area and permission of instructor.

EDUC 6423. Seminar in Policies and Procedures of Special Education Administration. Theory, research and practices related to special education administration. Analysis of administrative behavior, the process of decision making, special education leadership and organization changes, models of state and federal funding, budgeting, litigation procedures and program evaluation. 3 lecture hours a week. Prerequisite(s): EDUC 5603 or equivalent courses in the area and permission of instructor.

EDUC 6723. Practicum. 3–12 hours. Field placement. Type of placement will vary with student's area of major concentration and past experiences. Prerequisite(s): 12 semester hours of doctoral credit or permission of instructor.

EDUC 6903. Special Topics. Variable content; topics selected as needed. 3 lecture hours a week.

Electrical Engineering

Electrical Engineering, EENG

EENG 5310. Control Systems Design. 3 hours. Transform domain and state space representations of linear feedback systems, system stability, nonlinear systems, optimal control, bounded and time optimal control of linear systems. Prerequisite(s): EENG 2620 or equivalent.

EENG 5320. Systems Modeling and Simulation. 3 hours. Aims to systematically introduce the concepts and analytical tools required to abstract engineering problems from applications, and to simulate and analyze such problems. Topics include dynamical systems modeling, stochastic models, queueing models, Markov chains, model identification, Monte-Carlo simulation, model reduction, agent-based modeling, large-scale networks, and applications to ecological, biological, and modern infrastructure systems. Prerequisite(s): consent of department.

EENG 5330. Environmental Systems. 3 hours. (2;2) Includes foundations and practice of modeling and simulation of ecological and environmental systems; temporal and spatial analysis; dynamical systems; and applications of engineering to environmental problems. Prerequisite(s): consent of department.

EENG 5410. Microwave Engineering. 3 hours. Investigates the fundamental concepts and techniques in the area of RF/microwave circuit designs. Topics include RF/microwave transmission lines, RF matching networks, microwave resonators, microwave coupler and power dividers, microwave filters, and fabrication of RF/microwave circuits. Prerequisite(s): EENG 3410 or equivalent.

EENG 5420. Antenna Theory and Design. 3 hours.

Provides students with the fundamental theory in antenna designs and hands-on skills related to antenna designs and characterizations. Includes linear dipole antennas, loop antennas, patch antennas, RFID antennas, broadband and frequency-independent antennas, and antenna arrays.

Prerequisite(s): EENG 3410 or equivalent.

EENG 5520. Design and Testing of Digital Systems.

3 hours. Review of combinational logic, testing combinational circuits, sequential circuit synthesis, state minimization, state assignment, and structure of sequential circuits; state identification and fault detection experiments; testing of sequential circuits and design for testability.

Prerequisite(s): EENG 2710 or equivalent.

EENG 5530. Analog Integrated Circuit Design. 3 hours.

This course thoroughly investigates the fundamentals in design and analysis of analog and mixed-signal integrated circuits. Topics include analog MOS transistor models, current sources and sinks, circuit reference, amplifier, feedback amplifiers, differential amplifiers and operational amplifiers. Prerequisite(s): EENG 3520 or equivalent.

EENG 5540. Digital Integrated Circuit Design. 3 hours.

Focuses on the design of digital systems with an emphasis on hands-on chip design. Uses industry CAD tools to design, layout and simulate the VLSI circuits. Includes MOS transistor, circuit characterization, circuit simulation, combinational and sequential circuits, static and dynamic logic circuits, memories, and low power circuit design. Prerequisite(s): EENG 2710 and EENG 3510, or consent of department.

EENG 5550. Hardware Design Methodologies for ASICs and FPGAs. 3 hours.

Explores hardware design methodologies through the use of industry tools. Students use design automation tools to design, simulate and synthesize designs for standard cell-based ASICs and FPGAs using hardware description languages (e.g., VHDL and Verilog). Examines the synthesis concept to understand how hardware functions written in these hardware description languages are synthesized. Covers techniques for design optimization, simulation, and synthesis of combinatorial functions, data paths, and finite state machines in depth. Examines the differences between design flows for standard cell-based ASICs and FPGAs. Prerequisite(s): EENG 2710 or equivalent.

EENG 5610. Digital Signal Processing. 3 hours.

Introduction to modern digital signal processing theory and techniques. Includes discrete time signals and systems, sampling theorem, Z-transform, frequency analysis of signals and systems, discrete Fourier transform, fast Fourier transform algorithms, and digital filter design. Prerequisite(s): EENG 2620 or equivalent.

EENG 5620. Statistical Signal Processing. 3 hours.

Introduction to detection and estimation theories. Includes hypothesis testing, Neyman-Pearson detection theory, Bayesian detection theory, maximum-likelihood estimation, Cramer-Rao bound, Bayesian and minimum mean-squared error estimators, Kalman filter, and least-squares estimation. Prerequisite(s): EENG 2620 and MATH 3680 or equivalent.

EENG 5630. Adaptive Signal Processing. 3 hours.

Provides students with fundamental knowledge of modern adaptive signal processing theorems and algorithms and their applications. Includes search algorithms, LMS, RLS adaptive filtering, adaptive signal modeling and applications. Prerequisite(s): EENG 2620, EENG 3910 or equivalent.

EENG 5640. Computer Vision and Image Analysis.

3 hours. Introduction to computer vision and image processing, image geometry and photogrammetry, edge detection, feature extraction, shape representation, structural descriptions, object modeling, shape matching, semantic knowledge bases and imaging architectures, depth perception with stereo and photometric stereo, moving scene analysis and object tracking, multi-sensor data fusion, occluded object recognition by multi-sensor/multi-view integration, Computer vision applications.

EENG 5650. Speech Analysis, Synthesis and Recognition.

3 hours. Introduces the production of human speech, vocal tract, the hearing system, the units of speech, methods of analysis for speech signals, speech recognition technology, and computerized speech synthesis. Prerequisite(s): MATH 1710, MATH 1720, MATH 2700 or equivalent; or consent of instructor.

EENG 5810. Digital Communications. 3 hours.

Introduction to the analysis and design of digital communication systems. Includes decision theory, signal space, optimal receivers, modulation schemes, error performance, inter-symbol interference, fading channels, spread spectrum, and link budget analysis. Prerequisite(s): EENG 3810 or equivalent.

EENG 5820. Wireless Communications. 3 hours. Provides in-depth coverage in wireless and mobile networks.

Introduces fundamental theory and design of modern wireless communication systems. Topics include 2G and 3G wireless standards, cellular communications, mobile radio propagation, multipath fading channel characterization, channel equalization, and multiple access technique for wireless communications. Prerequisite(s): EENG 5810 or equivalent.

EENG 5830. Coding Theory. 3 hours.

Channel coding theorem, error-correcting codes, algebraic block codes, linear codes, BCH codes, convolutional codes, burst-error correcting codes, and design of encoders and decoders. Prerequisite(s): EENG 3810 or equivalent.

EENG 5840. Information Theory. 3 hours.

Explores the elements of information theory that form the foundation for coding in communication systems, the basic concepts of entropy, and ideas in source coding, channel coding, and channel capacity. Includes data compression (optimal codes), channel capacity (channel coding theorems), rate distortion theory (rate distortion functions for different sources), and network information theory (single user, broadcast, relay, and multiple access channels, and encoding of correlated sources). Prerequisite(s): consent of department.

EENG 5850. Image and Video Communications. 3 hours.

Explores topics ranging from the fundamentals of video coding, motion estimation, source and channel coding, and transform (wavelet and discrete cosine) coding to the state-of-the-art compression and multimedia standards such as MPEG-4, H.264, MPEG-7, and MPEG-21. Advanced research topics include video streaming, joint source-channel coding, distributed video coding, and video surveillance using sensor networks. Prerequisite(s): consent of department.

EENG 5890. Directed Study. 1–3 hours.

Directed study of topics in electrical engineering. The student prepares a plan for study of a topic and a plan for evaluation of study achievements. Open to students with graduate standing who are capable of developing problems, independently. May be repeated for credit. Prerequisite(s): consent of instructor.

EENG 5900. Special Problems. 1–3 hours. Independent research of a specific problem in a field of electrical engineering. A report is required defining the problem and a solution. Prerequisite(s): consent of instructor.

EENG 5932. Internship. 1–3 hours. Supervised work in a job that meets specific educational objectives of the department and is beneficial to the student's career development. Required submission of a final report summarizing industrial experience gained through the internship. Prerequisite(s): consent of department.

EENG 5940. Advanced Topics in Electrical Engineering. 1–3 hours. Contemporary topics at the advanced graduate elective level. Faculty present advanced elective topics not included in the established curriculum. Prerequisite(s): consent of instructor. May be repeated for credit as topics vary.

EENG 5950. Master's Thesis. 3–6 hours. To be scheduled only with consent of department. No credit assigned until thesis has been completed and filed with the School of Graduate Studies. Prerequisite(s): consent of department.

Electrical Engineering Technology

see *Undergraduate Catalog*

Elementary Education

see Teacher Education and Administration

Emergency Administration and Planning

see *Undergraduate Catalog*

Engineering Technology

Construction Engineering Technology – see *Undergraduate Catalog*

Electrical Engineering Technology – see *Undergraduate Catalog*

Engineering Technology – see *Undergraduate Catalog*

Engineering Systems, Master's Courses, MSES

MSES 5010. Seminar in Engineering Systems. 3 hours. In-depth examination of current theories, research, trends and processes of industry. Readings, individual study and research, information exchange and guest lectures provide an understanding of selected industrial topics. May be repeated for credit.

MSES 5020. Design of Experiments. 3 hours. A study of industrial analytical techniques used to develop new products and new technologies, including the use of engineering software for design purposes.

MSES 5030. Product Design and Development. 3 hours. Formal development of the process of designing a product, including ideas generation, engineering development, modeling and analysis, and project planning and management.

MSES 5040. Analytical Methods for Engineering Systems. 3 hours. Procedures for confidently detecting variances from specification in manufactured products; applications of matrix manipulations for multivariate analysis, engineering applications of residues calculated from circular integrals, integration and differentiation of 3-dimensional engineering functions.

MSES 5060. Technology Innovation. 3 hours. Topics include understanding innovation, processes of technology innovation, techniques of technology innovation (TRIZ), planning for innovation, using innovation technology, and engineering technologies case analyses.

MSES 5100. Nontraditional Manufacturing Processes. 3 hours. Analysis of selected contemporary and emerging manufacturing/production processes utilizing high-level automation, productivity-enhancing technologies and/or specialty technologies; emphasis on process structure, organization, economics and application within the industrial environment.

MSES 5120. Computer-Integrated Manufacturing. 3 hours. (2;2) Computerization in manufacturing/production from an integrated systems perspective; emphasis on selected contemporary and emerging applications such as design/documentation, engineering analysis, process planning, machine tool programming, automated material handling and inspection, and factory networking.

MSES 5130. Product Reliability and Quality. 3 hours. Processes and techniques of assuring the quality of industrial products; reliability and maintainability, sampling probability and statistical process control; quality control management.

MSES 5150. Applications of Electron Microscopy and Failure Analysis. 3 hours. (2;2) Scanning and transmission electron microscopy applications in failure analysis will be discussed along with ductile, brittle, fatigue and corrosion related failure mechanisms. Applications of fracture mechanics, elevated temperature failures of welded and cast components will be discussed.

MSES 5200. Advanced Construction Scheduling. 3 hours. Analysis and control of construction projects using advanced techniques for planning, scheduling and resources control. Subjects include various methods of project scheduling and monitoring, resource management, time-cost tradeoffs, organizing and managing schedule data, forecasting and trend analysis, and presentation of schedule information.

MSES 5220. Building Information Modeling. 3 hours. (2;3) Study of the concept and applications of the building information model (BIM) and electronic data interchange (EDI) between building software applications for architectural design, structural analysis, estimating, construction scheduling, project management and facility management. Topics expand beyond traditional 3D modeling to include state-of-the-art 5D modeling that incorporates the dimensions of cost and time into the BIM for a total building life cycle view.