

Department of Electrical Engineering and Computer Science

Contact Information

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Graduate Program Objective

The objective of the graduate electrical engineering and computer science programs is to produce graduates with broad and up-to-date knowledge, skills and judgment, prepared for professional careers in industry and/or further studies that emphasize advanced design, development, and research methods.

Degrees Offered

- Ph.D. in Engineering, with specializations in Electrical Engineering (which includes Computer Science areas), Mechanical Engineering, Civil Engineering, Chemical Engineering, and Sustainable Energy Engineering.
- Master of Science degrees in Electrical Engineering, Computer Science, or Mechatronics Engineering (jointly offered with Mechanical Engineering).

Facilities

The facilities of the department include laboratories for work in electronics, microwaves, controls and dynamic systems, signal processing, energy conversion, electric drives and power electronics, microcomputer system development and a wide range of digital and analog computational facilities, including a MAC lab, PC labs, and a High-Performance Computing Center.

Computer Science (CSEN)

CSEN 5303 Adv Topics in Computer Sci **1-3 SCH (1-3)**

One or more advanced topics. May be repeated when topic changes. (Credit may not be obtained for both CSEN 5303 and EEEN 5303 courses if the topic is the same.)

CSEN 5304 Adv Computer Architecture **3 SCH (3-0)**

Introduces the design principles of modern computers. The topics include RISC and CISC architecture, interconnection networks, multiprocessors and multicomputer systems, dataflow and systolic arrays, future outlook for architectures and the basics of parallel algorithms. (Credit may not be obtained in both CSEN 5304 and EEEN 5304.)

CSEN 5305 Graduate Research Project **3 SCH (3)**

Designed for project option students and requires completion of research project. Prerequisite: departmental approval. May be repeated for a maximum of 6 semester hours.

CSEN 5306 Thesis **3 SCH (1-3)**

Designed for thesis option students. The course requires completion of thesis research. Prerequisite: departmental approval. May be repeated for maximum of 10 semester credit hours.

CSEN 5313 Compiler Design **3 SCH (3-0)**

This course introduces the structure of a compiler and the various techniques used for designing a compiler. Topics include grammars, parsing methods, implementation details and translator writing systems.

CSEN 5314 Database Systems **3 SCH (3-0)**

Basic concepts and architecture of database systems, ER model, relational model, relational algebra, SQL, ER-to-relational mapping, functional dependencies normalization, database design process, object-oriented database. Distributed database. Prerequisite: graduate standing in computer science or another engineering discipline.

CSEN 5320 Artificial Intelligence **3 SCH (3-0)**

Fundamental concepts of intelligent computer systems, knowledge representation, logical reasoning, search strategies, game theory, Bayesian networks, neural networks, reinforcement learning, natural language processing, and current research in AI area.

CSEN 5321 The Ethics of AI **3 SCH (3-0)**

Explores ethical issues that arise with the development of AI technologies; traditional ethical theories; the moral status of AI: thinking machines, moral agents and moral patients; AI consciousness; algorithmic bias; accountability; transparency; AI bias and opinion manipulation; the ethical use of generative AI in art and research; AI friendship; policies and regulations; AI creativity, authorship, and intellectual property.

CSEN 5322 Operating systems 3 SCH (3-0)

Operating systems principles; procedures and their implementation; protection, concurrent, cooperating and communicating processes; storage management; resource allocation; scheduling; file systems; and system design issues.

CSEN 5323 Computer Comm Networks 3 SCH (3-0)

The International Standards Organization (ISO) Open Systems Interconnection (OSI) model as a framework for the study of computer communication networks. Data communication. Functions and protocols of physical layer, medium access sublayer, link layer, network layer and transport layer. Case studies. ISDN. Prerequisite: graduate standing in computer science or electrical engineering.

CSEN 5325 Software Engineering 3 SCH (3-0)

Covers development life-cycle models, inspection process, software quality metrics, testing, validation metrics, estimation and scheduling. Prerequisite: graduate standing in engineering.

CSEN 5330 Data Mining 3 SCH (3-0)

Types of data, similarity and distance functions, data preprocessing, sampling, feature selection, discretization, attribute transformation, classification and prediction methods, decision trees, support vector machines, regressions, classification rules, Bayesian learning, neural networks, association rule mining, sequential pattern mining, cluster analysis, anomaly detection.

CSEN 5332 Machine Learning 3 SCH (3-0)

Fundamental concepts of machine learning including supervised and unsupervised learning, deep learning, probabilistic models, and reinforcement learning; covers key algorithms such as decision trees, neural networks, support vector machines, prototype methods and nearest neighbors, ensemble learning, and undirected graphical models; algorithm design, model evaluation, and optimization techniques.

CSEN 5333 Real Time Systems 3 SCH (3-0)

Characteristics of systems and techniques used in real time computer applications. Scheduling theory, verification and design techniques including simulation and probabilistic models. Prerequisite: graduate standing.

CSEN 5336 Analysis of Algorithms 3 SCH (3-0)

Introduction of the design and analysis of computer algorithms. Topics include asymptotic efficiency; a survey of useful algorithms for sorting, information retrieval, and graphs; paradigms for algorithm design; and a brief introduction to complexity classes including NP. Prerequisite: graduate standing.

CSEN 5340 Parallel Computing 3 SCH (3-0)

Principles of parallel algorithm design: task decomposition, synchronization, load balancing, computational dependencies; parallel computing architectures; collective communications; analyzing parallel algorithms; scalability, efficiency, speedup; parallel algorithms for fundamental problems such as sorting; shared-memory programming; distributed-memory programming; hybrid programming; message passing interface; GPU architecture and programming; transactional memory.

CSEN 5344 Cloud Computing 3 SCH (3-0)

Cloud computing, services, and technologies for hosting, storing, and processing data on the cloud. Fundamentals of cloud computing using cloud services, such as cloud servers, databases, and data warehouses, along with principles and architectural foundations upon which cloud computing is based. Software design and implementation strategies that support the integration and exploitation of cloud-based resources, integration of cloud infrastructure into the design of software systems, security considerations associate with cloud computing, such as the use of public, private, and hybrid cloud resources.

CSEN 5346 Data Science I 3 SCH (3-0)

Introduction to data science and data analytics programming in Python using libraries such as NumPy for computational array operations, SciPY for scientific and numerical computing, Pandas for data analysis and manipulation; an overview of techniques and methods for loading datasets, formatting data, feature analysis, and processing large amounts of data; collecting, pruning, munging, analyzing, visualizing, and processing data; building machine learning models, training them with data, testing the models to evaluate their performance, and using the models to make decisions or predictions.

CSEN 5347 Data Science II 3 SCH (3-0)

Methods and tools used to analyze, visualize, and derive insights from complex data; data wrangling, statistical analysis, predictive modeling, data-driven decision making; applications in machine learning, natural language processing, and big data analytics; data analysis lifecycle, data acquisition and cleaning, model deployment, and result interpretation.

CSEN 5350 Neural Networks Application 3 SCH (3-0)

Includes a review of network architectures, perceptron, linear networks, back-propagation and radial basis networks. A real-time laboratory experience in seeing the application of neural networks. Prerequisite: graduate standing in Computer Science. (Credit may not be obtained in both CSEN 5350 and EEEN 5350.)

CSEN 5352 Bioinformatic Computing 3 SCH (3-0)

Computational and statistical algorithms in Python and Biopython for bioinformatics and biological applications. Computational tools for analyzing and modeling biological sequences of genes and proteins stored in databases in the GenBank, FASTA, and PDB formats. Gene and protein modeling, design, visualization, optimization, structure prediction, sequence analysis, sequence similarity search using BLAST, parsing, analyzing, transcribing and translating gene or protein sequences.

CSEN 5356 Mobile Application Development 3 SCH (3-0)

Design and development of software for mobile platforms including: user interface design, user experience factors, processes, threading, multitasking, database integration, application lifecycles, resource constraints in mobile environments, app security, cloud and network integration.

CSEN 5362 Cyber Intelligence 3 SCH (3-0)

Challenges and opportunities, static malware analysis, anomaly detection in communication networks, ransomware network traffic detection, detection of crypto-ransomware, botnet traffic detection, investigation of OpenFlow-Based SDN platforms, mobile forensics, and model probing attack. Prerequisites: CSEN 5320, CSEN 5330, CSEN 5332, CSEN 5346, or CSEN 5347.

CSEN 5364 Advanced Cybersecurity 3 SCH (3-0)

This course explores advanced concepts, techniques, and tools used in modern cybersecurity defense and threat detection. Topics include advanced malware analysis, intrusion detection systems, network security monitoring, threat intelligence, digital forensics, adversarial tactics, cyber threat modeling, security analytics, and emerging security challenges in cloud systems, Internet of Things (IoT), and AI-driven environments.

CSEN 5401 Adv Probs in Computer Sci 1-4 SCH (1-4)

Individual or group research on advanced problems conducted under the supervision of a faculty member. Maximum credit 8 semester hours.

Electrical Engineering (EEEN)**EEEN 5303 Advanced Topics in Elec Eng 1-3 SCH (1-3)**

One or more advanced topics. May be repeated when topic changes. (Credit may not be obtained in both EEEN 5303 and CSEN 5303 courses if the topic is the same.)

EEEN 5304 Adv Computer Architecture 3 SCH (3-0)

Introduces the design principles of modern computers. The topics include RISC and CISC architectures, interconnection networks, multiprocessors and multicomputer systems, dataflow and systolic arrays, future outlook for architectures and the basics of parallel algorithms. (Credit may not be obtained in both EEEN 5304 and CSEN 5304.)

EEEN 5305 Graduate Research Project 3 SCH (3)

Designed for project option students and requires completion of research project. Prerequisite: departmental approval. May be repeated for a maximum of 6 semester hours.

EEEN 5306 Thesis 3 SCH (1-3)

Designed for thesis option students. The course requires completion of thesis research. Prerequisite: departmental approval. May be repeated for maximum of 6 semester hours.

EEEN 5307 Analysis and Design of Analog Integrated Circuits 3 SCH (3-0)

Bipolar transistor small and large signal models, single and multiple transistor amplifiers, current mirrors, active loads, output stages, operational amplifier with single-ended outputs.

EEEN 5309 Nanofabrication and Nanoscale Devices 3 SCH (3-0)

This course is designed to give students experience in nanofabrication methods such as thin film deposition, etching, implantation, and lithography to manipulate various materials including dielectrics, semiconductors, organics, polymers, metallic materials, and molecular films. In addition, this course will introduce MEMS/NEMS and advanced nanoscale CMOS devices. Prerequisites: graduate standing.

EEEN 5310 Solar Energy: Fundamentals of Photovoltaics 3 SCH (3-0)

In this course, you will learn about traditional solar cell architectures, 1st and 2nd generation solar cells, nanotubes and nanowires-based solar cells, thin-film organic conjugates solar cells, CIGS solar cells, plasmonic effects, and light trapping. Prerequisite: graduate standing.

EEEN 5311 Nonlinear Systems and Deep Learning Control 3 SCH (3-0)

Nonlinear systems and stability, linearization, phase plane analysis, Lyapunov stability, feedback linearization, sliding mode control, reinforcement learning, and deep learning for control.

EEEN 5313 Robust Control 3 SCH (3-0)

Signal and system norms, Structured and unstructured uncertainty, Robustness (stability and performance) analysis of control systems in time and frequency domains, Linear Matrix Inequalities (LMI), Linear Fractional Transformations (LFT), H-2, H-infinity and mu controller designs. Prerequisite: Graduate standing.

EEEN 5316 Semiconductor Fundamentals 3 SCH (3-0)

Quantum Mechanics, energy band theory, carrier statistics, recombination-generation, carrier transport.

EEEN 5317 Adaptive Array Processing 3 SCH (3-0)

Array signal processing fundamentals, beamforming techniques, direction of arrival (DOA) estimation algorithms, adaptive algorithms like LMS and RLS, smart antenna system design, interference suppression methods, applications in wireless communications, and simulation and design of antenna arrays.

EEEN 5321 Digital Computer Design 3 SCH (3-0)

Register operations, arithmetic operations, control of operations, memory systems, methods of input and output. Examples of commercial systems, system design of a general purpose computer.

EEEN 5326 Dynamic Systems I 3 SCH (3-0)

Mathematical analysis of engineering, dynamic systems. Modeling, simulation, transfer functions, state variables, stability of linear systems.

EEEN 5329 Adaptive Control 3 SCH (3-0)

Signal and system norms, Lp functions, adaptive parameter identification and control, stability, Model Reference Adaptive Control (MRAC), multi objective evolutionary/genetic algorithms, adaptive backstepping, and robust adaptive control laws.

EEEN 5330 Rapid Prototyping ASIC Design 3 SCH (3-0)

Principles of electronic system design using Application-Specific Integrated Circuits (ASIC) approach: digital hardware modeling techniques using an HDL, logic simulation, logic synthesis, standard cells, gate arrays, sea of gates, bit serial hardware design methods and analog methods.

EEEN 5331 Digital Signal Processing 3 SCH (3-0)

Digital processing of signals, z-transform, digital filters, discrete and fast Fourier transforms, power spectrum, autocorrelation, cepstrum analysis.

EEEN 5333 Prin of VLSI Circuit Design 3 SCH (3-0)

Principles of design and fabrication of microelectronic circuits via Very Large Scale Integrated circuitry (VLSI), structured design methods for VLSI systems, use of computer-aided design tools, design projects of small to medium scale integrated circuits.

EEEN 5337 Digital Image Processing 3 SCH (3-0)

Introduces the computer vision systems. Topics include edge detection, spatial-domain processing, frequency-domain processing, color processing, texture analysis, shape analysis and making movies from a deck of frames.

EEEN 5338 Digital and DSP Based Control 3 SCH (3-0)

Classical and modern control analysis and design methods and techniques. Topics include discrete control system analysis, sampled data systems, discrete equivalents of continuous systems, design using transform techniques, design using state-space methods and the real-time control of dynamic systems using digital computers and micro-controllers.

EEEN 5339 Embedded System Design 3 SCH (3-0)

Embedded system architecture and programming. Role of microprocessors, FPGAs, and PLCs; input/output; analog and digital interfacing; sensor networks and peripherals in hardware integration. (Credit may not be obtained for this course and for MHEN 5373).

EEEN 5340 Speech Processing 3 SCH (3-0)

Fundamentals of digital signal processing, waveform coding, speech spectrum, voice coders, linear predictive coding, speech recognition, adaptive noise cancellation and multirate signal processing.

EEEN 5341 Advanced Integrated Circuits 3 SCH (3-0)

Advanced concepts of circuit design for digital /analog (mixed signal) Very Large Scale Integrated Circuitry (VLSI) components in state-of-the-art Complementary Metal Oxide Semiconductor (CMOS) technologies. Emphasis is on the design and optimization of high-speed (high performance devices), high density (heterogeneous systems on a chip), low-power (portable applications) and analog (mixed-signal) integrated circuits. Prerequisites: Undergraduate degree in engineering or physical sciences.

EEEN 5342 Wireless Communications 3 SCH (3-0)

This course introduces fundamental concepts and technologies in the area of wireless communication systems such as wireless applications, modulation techniques, wireless channel models, digital communication over wireless channels, multiple access techniques, and wireless standards.

EEEN 5350 Neural Networks Application 3 SCH (3-0)

Includes a review of network architectures, perceptron, linear networks, back-propagation and radial basis networks. A real-time laboratory experience in seeing the application of neural networks. Prerequisite: graduate standing in Computer Science. Prerequisite: graduate standing in Electrical Engineering. (Credit may not be obtained in both EEEN 5350 and CSEN 5350.)

EEEN 5371 Mechatronic Systems 3 SCH (3-0)

Mechanical Processes and Components; Electrical Systems and Sensors; Actuators; PLCs; Data Acquisition; Machine Vision; Noise, Analysis and Design Considerations. Credit may not be obtained in both EEEN 5371 and MHEN 5371.

EEEN 5401 Advanced Probs in Elec Eng 1-4 SCH (1-4)

Individual or group research on advanced problems conducted under the supervision of a faculty member. Maximum credit 8 semester hours.

Graduate Programs

- Computer Science - Artificial Intelligence, M.S.
- Computer Science, M.S.
- Electrical Engineering, M.S.

Academic Certificates

- Applied Artificial Intelligence, Academic Certificate
- Cyber Intelligence, Academic Certificate
- Data Science, Academic Certificate
- Intelligent Autonomous Robotics and Control Systems, Academic Certificate
- Next-Generation Wireless and 6G Communication Systems, Academic Certificate
- Semiconductor and Microelectronics Systems (CHIPS), Academic Certificate

Planned Course Offerings

This section provides a comprehensive list of graduate courses offered by the Department of Electrical Engineering and Computer Science, along with a two-year schedule indicating when each course is expected to be available. Please note that course offerings and scheduling are subject to change based on faculty availability and student demand. To ensure steady progress toward degree completion, students are strongly encouraged to work closely with their advisor to develop a personalized academic plan.

Computer Science (CSEN)

Course	Fall 2026	Spring 2027	Fall 2027	Spring 2028
CSEN 5303	X	X	X	X
CSEN 5304	X	X	X	X
CSEN 5305	X	X		X
CSEN 5306	X	X	X	X
CSEN 5313	X		X	
CSEN 5314	X	X	X	X
CSEN 5320	X		X	
CSEN 5322	X		X	
CSEN 5323	X	X	X	X
CSEN 5325 ¹				
CSEN 5330	X		X	
CSEN 5332		X		X
CSEN 5333		X		X
CSEN 5336	X	X	X	X
CSEN 5340	X			
CSEN 5344		X		X
CSEN 5346	X		X	
CSEN 5347	X			
CSEN 5350		X		X
CSEN 5352	X		X	
CSEN 5401	X		X	

¹ This course is available during the summer term only.

Electrical Engineering (EEEN)

Course	Fall 2026	Spring 2027	Fall 2027	Spring 2028
EEEN 5303	X	X	X	X
EEEN 5304		X		X
EEEN 5305	X	X		X
EEEN 5306	X	X	X	X
EEEN 5307	X		X	
EEEN 5309	X		X	
EEEN 5310		X		X
EEEN 5311		X		X
EEEN 5313		X		X
EEEN 5316	X			
EEEN 5317	X			
EEEN 5321	X			
EEEN 5326		X		X
EEEN 5329		X		X
EEEN 5330 ¹				
EEEN 5331	X		X	
EEEN 5333	X		X	

EEEN 5337		X	X
EEEN 5338	X		
EEEN 5339		X	X
EEEN 5340	X		
EEEN 5341 ¹			
EEEN 5342	X		
EEEN 5350		X	X
EEEN 5371		X	
EEEN 5401	X		

¹ This course is available during the summer term only.

Marketable Skills

Texas A&M University-Kingsville is dedicated to equipping graduate and doctoral students with the advanced marketable skills necessary for professional and academic excellence beyond the university setting. These skills encompass a range of high-level interpersonal, analytical, and applied competencies that are sought after in today's competitive workforce.

Our graduate programs are structured to cultivate these capabilities through rigorous academic inquiry, experiential learning, faculty-mentored research, professional internships, and opportunities for scholarly and community engagement.

Below are the marketable skills cultivated through each of the department's graduate academic programs.

Computer Science, M.S.

- Ability to apply knowledge of mathematics and computing
- Effective communication
- Ability to use current techniques, skills, and modern tools necessary for computing practice
- Ability to propose and complete new research

Electrical Engineering, M.S.

- Ability to apply knowledge of mathematics, science, and engineering
- Effective communication
- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- Ability to propose and complete new research