

# DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

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## Contact Information

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**Room Number:** 207

## 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

- The Ph.D. degree is available in Sustainable Energy Systems Engineering.
- The Master of Science degree is available in both Electrical Engineering and Computer Science.

## 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.

## Faculty

### Graduate Faculty

**Hossain, Gahangir** Assistant Professor, Department of Electrical Engineering and Computer Science; B.S., Shahjala University of Science and Technology (Bangladesh); M.Sc., Bangladesh University of Engineering and Technology (Bangladesh); M.S., The University of Memphis; Ph.D., The University of Memphis.

**Leung, Chung S** Associate Professor, Department of Electrical Engineering and Computer Science; B.S., Florida Institute of Technology; M.S., Florida Institute of Technology; Ph.D., Florida Atlantic University.

**Nijim, Mais** Associate Professor, Department of Electrical Engineering and Computer Science; B.S., Princess Sumaya University for Technology (Jordan); M.S., New Mexico State University; Ph.D., New Mexico Institute of Mining and Technology.

**Omar, S. Iqbal** Professor, Department of Electrical Engineering and Computer Science; B.S., Allahabad University (India); B.S., Aligarh University (India); M.E., Indian Institute of Science (India); Ph.D., Carleton University (Canada).

**Park, Sung-won** Professor, Department of Electrical Engineering and Computer Science; B.E., Hanyang University (South Korea); M.E., Hanyang University (South Korea); M.S.E.E., University of New Mexico; Ph.D., University of New Mexico.

**Verma, Amit** Associate Professor, Department of Electrical Engineering and Computer Science; B.Tech, Institute of Technology (India); M.S., Vanderbilt University; Ph.D., Georgia Institute of Technology.

**Yang, Xue** Assistant Professor, Department of Electrical Engineering and Computer Science; B.E., Beijing University of Chemical Technology (China); M.S., Texas Tech University; Ph.D., Texas Tech University.

**Yilmazer, Nuri** Associate Professor, Department of Electrical Engineering and Computer Science; B.S., Cukurova University (Turkey); M.S., University of Florida; Ph.D., Syracuse University.

## Associate Member

**Aurangzeb, Muhammad** Assistant Professor, Department of Electrical Engineering and Computer Science; B.S., University of Punjab (Pakistan); B.S., University of Engineering and Technology (Pakistan); M.S., University of Engineering and Technology (Pakistan); M.S., National University of Computer and Engineering Sciences (Pakistan); Ph.D., The University of Texas at Arlington.

**Fu, Xiangang** Visiting Assistant Professor, Department of Electrical Engineering and Computer Science; B.S., Ocean University of China (China); M.S., Ocean University of China (China); Ph.D., University of Alabama.

**Goyal, Ayush** Assistant Professor, Department of Electrical Engineering and Computer Science; B.S., Boise State University; Ph.D., University of Oxford (United Kingdom).

**Khan, Mohammad S** Assistant Professor, Department of Electrical Engineering and Computer Science; B.S., Bangladesh University of Engineering and Technology (Bangladesh); M.S., North Dakota State University; Ph.D., Purdue University.

**Toscano, George** Visiting Assistant Professor, Department of Electrical Engineering and Computer Science; B.S., Bangladesh University of Engineering and Technology (Bangladesh); M.S., Bangladesh University of Engineering and Technology (Bangladesh); Ph.D., University of Texas at Arlington.

## Emeritus

**Diersing, Robert** Professor of Electrical Engineering, Department of Electrical Engineering and Computer Science; B.B.A., Texas A&I University; M.S., Texas A&I University; M.B.A., Corpus Christi State University; Ph.D., Texas A&M University.

**Gorakhpurwalla, Homi** Professor of Electrical Engineering and Computer Science, Department of Electrical Engineering and Computer Science; B.S., Bombay University (India); B.S.E.E., Purdue University; M.S.E.E., Purdue University.

## Courses

### 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 (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.

**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 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 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 5334** Algor Graph and Perfect Graphs **3 SCH (3-0)**

Introduction to new results in algorithmic graph theory and perfect graphs. Presentation of algorithms and applications associated with different structured families of graphs. Survey of new research directions. 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 5337 Theory of Computation 3 SCH (3-0)**

Examination of Turing machine theory; decidability; reduction of one problem to another; complexity theory; and NP-completeness. Analysis of the intrinsic difficulty of entire classes of problems. Prerequisite: graduate standing.

**CSEN 5339 Embedded System Design 3 SCH (3-0)**

Embedded system architecture and programming. Role of microprocessors, input/output, analog and digital interfacing, and peripherals in hardware integration. (Credit may not be obtained for this course and for EEEN 5339. Prerequisites: EEEN 5333 and EEEN 5330 (or approval of instructor).

**CSEN 5350 Application of Neural Networks 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 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 (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 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 5324 Control System Synthesis 3 SCH (3-0)**

Actuators and transducers, static and dynamic accuracy of systems, describing functions, compensation, design of typical control systems.

**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. Prerequisite: EEEN 4354 or consent of instructor.

**EEEN 5330 Rapid Prototyping and ASIC Dsgn 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 5335 Microcomputer Based Design 3 SCH (3-0)**

Role of microcomputers, register and data manipulation, hardware, memory, input/output, hardware and software development, algorithmic processes.

**EEEN 5336 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.

**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, input/output, analog and digital interfacing, and peripherals in hardware integration. (Credit may not be obtained for this course and for CSEN 5339). Prerequisites: EEEN 5333 and EEEN 5330 (or approval of instructor).

**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 Digital Integrated Ckts 3 SCH (3-0)**

Advanced concepts of circuit design for digital 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) and low-power (portable applications) integrated circuits. Prerequisite: EEEN 5333 and EEEN 5330 (or approval of instructor).

**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 Application of Neural Networks 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 EEEN 5350 and CSEN 5350.)

**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.