Electrical and computer engineering Department

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Degrees Awarded
M.S. in Electrical Engineering and Ph.D. in Electrical Engineering

Web Site
http://www.stonybrook.edu/commcms/electrical/

Application
https://graduateadmissions.stonybrook.edu/apply/

Electrical and Computer Engineering Department

The fields of electrical and computer engineering are in an extraordinary period of growth; new application areas and increased expectations are accelerating due to new technologies and decreased costs. The Electrical and Computer Engineering Department, in the College of Engineering and Applied Sciences, is involved in graduate teaching and research in many of these areas, including communications and signal processing, networking, computer engineering, power engineering, semiconductor devices and quantum electronics, circuits and VLSI. The department has laboratories devoted to research and advanced teaching in the following areas: computing, engineering design methodology, high-performance computing and networking, parallel and neural processing, machine vision, fiber optic sensors and computer graphics, micro and optoelectronics, power electronics, electric power and energy systems, VLSI, telerobotics, DNA sequencing, digital signal processing, and communications.

Since Long Island contains one of the highest concentrations of engineering-oriented companies in the country, the department is particularly strongly committed to meeting the needs of local industry. As part of this commitment, most graduate courses are given in the late afternoon or evening, so as to be available to working engineers on Long Island.

The Department of Electrical and Computer Engineering offers graduate programs leading to the M.S. and Ph.D. degrees. Graduate programs are tailored to the needs of each student to provide a strong analytical background helpful to the study of advanced engineering problems.

Ample opportunities exist for students to initiate independent study and to become involved in active research programs, both experimental and theoretical.

Areas of Emphasis in Graduate Study

Areas of emphasis in current research and instruction are: Communications and Signal Processing, Computer Engineering, Power Engineering, Semiconductor Devices and Quantum Electronics, Circuits and VLSI.

Specialties that fall under one or more of the above categories include: VLSI, Image Processing, Computer Vision, Integrated Circuit Fabrication, Novel Electronic and Photonic Devices, Microgrids, Power System Optimization and Modeling, Power Electronic Devices and Circuits, Digital Communication, Cyber Security, Biomedical Electronics, Computer-Aided Design, Computer Networks, Parallel Processing, Fault-Tolerant Computing, Microprocessors, Robotics, Network Theory, and Optical Signal Processing and Fiber Optic Sensors.

Theoretical and experimental programs reflecting these areas are currently underway and students are encouraged to actively participate in these efforts. Outlined below is an overview of the Department's research areas.

Communications and Signal Processing
Subject areas of current interest include mobile, wireless and personal communications; high speed data and computer communication networks; communications traffic; data compression; coding and modulation techniques; inter-connection networks and high speed packet switching; digital communication; detection and estimation; statistical signal processing; spectrum estimation; image analysis and processing; computer vision.

Computer Engineering
The goal of computer engineering in the ECE department is to provide a balance view of hardware and software issues. The expertise in the program include parallel and/or high performance and/or energy efficient computer architecture, embedded microprocessor system design, fault tolerant computing, design communications and signal processing, parallel and distributed computing, computer networks, cybersecurity, computer vision, artificial neural networks and software engineering.

Power Engineering

Power engineering deals with various aspects of the modern and emerging power systems including power electronics hardware, power grids, and renewable energy technologies. The Program covers a combination of fundamental and applied courses in power system analysis, power system dynamics, microgrids, power system optimization, modeling and analysis of photovoltaic power systems, probabilistic methods in power and energy, power system economics, electricity market, artificial intelligence for energy systems, quantum engineering, fundamentals of power electronic devices and circuits, basic converter modeling/control, EMI filtering in power converters, power module packaging and integration, and power-electronics-converter applications in motor drives & renewable energy systems.

Semiconductor Devices, Quantum Electronics
The program of courses and of research pertinent to solid-state electronics, electromagnetics and optics ranges from a study of the fundamental electronic processes in solids through a description of the mechanism which yield useful devices to a study of the design simulation, and fabrication of semiconductor devices and integrated circuits. Program's scientific interests center on physics and technology of optoelectronic devices and systems. Over the past several years, major efforts were focused on the design and development of the novel semiconductor lasers and detectors. Additionally, the department has a strong experimental effort on the development of coherent optical processors, fiber optic sensors and integrated fiber optics.

Circuits and VLSI
The program in the Circuits and VLSI area addresses problems associated to modeling, simulation, design and fabrication of analog, digital, and mixed-signal integrated circuits. Analog and mixed-mode integrated circuit (IC) devices have important applications in many fields including avionics, space technology, and medical technology. The department offers basic and advanced courses covering the following subjects: integrated circuit technology, device modeling, software tools for circuit design and simulation, analog and digital circuit design, VLSI circuits, testing of analog and digital ICs, design automation for analog, digital and mixed-mode circuits, VLSI systems for communications and signal processing.

Admission requirements of Electrical and Computer Engineering Department

For admission to graduate study in the Department of Electrical and Computer Engineering, the minimum requirements are:

A. A bachelor's degree in electrical or computer engineering or computer science from an accredited college or university. Outstanding applicants in other technical or scientific fields will be considered, though special make-up coursework over and above the normal requirements for a graduate degree may be required.

B. A minimum grade point average of B in all courses in engineering, mathematics, and science.

C. Acceptance by both the Department of Electrical and Computer Engineering and the Graduate School.

Facilities of Electrical and Computer Engineering Department

The department operates laboratories for both teaching and research:

The Advanced Power Electronics Laboratory supports research and education efforts in the field of power electronics and energy conversion systems for various application ranging from solar power to aircraft propulsion. The lab is working on design of high-density and high-efficiency converters based on wide bandgap semiconductors as well as advanced power module packaging and high-density filtering solutions. Lab research interests include design of the basic converter topologies and controls, converter system modeling/control, electro-magnetic modeling, and power module packaging architecture/process development.

The Computer-Aided Design Laboratory offers access to large assortment of software tools used to analyze, model, simulate, and better understand various engineering concepts. The lab comprises 40 Dell PC's, that are networked via switched Ethernet to a Dell file server.

The Computer Vision Laboratory has a network of PC's, digital imaging hardware, and custom-built Computer Vision Systems for experimental research in 3D vision and digital image processing.

The COSINE Laboratory supports the research efforts of faculty members and graduate and undergraduate students in the areas of signal processing, communications, and networking. Current and recent research projects involve Bayesian signal processing, inference, Monte Carlo signal processing, signal modeling, machine learning, deep networks, signal processing over networks, graph signal processing, sensor signal processing, positioning and navigation, biomedical signal processing, wireless networks, radio-frequency identification, the Internet of Things, computer networking, data transmission, multiple-access systems, scheduling, network performance evaluation, grid computing, information theory, and image processing.

The Digital Signal Processing Laboratory is involved in digital signal processing architectures and hardware and software research. The laboratory has extensive list of relevant software and hardware tools.

The Electric Power and Energy Systems Laboratory is dedicated to enabling innovations for different layers of grid infrastructures that will transform today's power grids into tomorrow's autonomic networks and flexible services towards self-configuration, self-healing, self-optimization, and self-protection against grid changes, renewable power injections, faults, disastrous events and cyber-attacks. Our lab conducts cutting edge research in Quantum Grid (QGrid), Smart Programmable Microgrids (SPM), networked microgrids with a focus on learning-based control and stability, formal methods and reachability analysis, software-defined smart grid, cyber-physical resilience of power grid, power system stability and control, and real-time electromagnetic transient analysis.

The Fiber Optic Sensors Laboratory (FOSL) - Research emphasis is on the development and fabrication of novel fiber optic systems for very diverse applications ranging from aerospace to biomedical. Research work has been supported by NSF, NASA, NIH and various state and industrial partners. Some of the current research projects include development of capillary waveguide based biosensors for detection of

pathogens in a marine environment, laser debridement, cavity sensors for flight control surfaces, and photonic power conversion for mobile platforms. The laboratory is equipped with various capabilities for optical and electronic diagnosis. These include a fiber optic fusion splicer, fiber polisher, diamond saw, optical microscope, optical spectral analyzer, single photon-counting systems, a high speed digital autocorrelator and various laser sources. Additionally, the laboratory has the facilities for designing and fabricating printed circuit boards and fabricating optical and electronic sub-systems.

The Fluorescence Detection Laboratory is involved in the design and development as well as implementation and testing of various instruments for Life Sciences. Research areas include laser induced fluorescence detection, single photon counting techniques, fast data acquisition and transfer, design and development of analog and digital integrated circuits, signal processing, capillary electrophoresis phenomena, DNA sequencing, and microfluidics.

The Graduate Computing Laboratory has extensive computational capabilities to support student's research and studies. Industry standard packages such as Cadence tools, Synopsys, Matlab, and many others are available.

The Hardware Generation and Optimization (HGO) Laboratory is dedicated to the design and optimization of digital systems, computer architecture, hardware for artificial intelligence, and field-programmable gate arrays (FPGAs). The lab is equipped with FPGA development environments, servers and desktop PCs, and related CAD tools.

The High-Performance Computing and Networking Research Laboratory is equipped to conduct research in the broad area of networking and parallel/distributed computing with emphasis on distributed quantum computing, quantum networks, edge computing, wireless/mobile networks, cloud computing, data center networks.

The Integrated Microsystems Laboratory focuses on advancing fundamental knowledge in the areas of near-zero-power communication, sensing and computing and design and engineering of sensory microsystems that operate using only harvested energy. We develop both core technologies and applications along several research thrusts founded on the tiny self-powered sensors distributed through an environment or implanted within a human body that coherently sense and analyze their surroundings. The applications are wide ranging with potential impact in various fields, such as smart spaces, environmental/infrastructure monitoring, and personalized healthcare.

The Nanoscale Circuits and Systems (NanoCAS) Laboratory focuses on developing design methodologies for high performance as well as energy efficient integrated circuits with a variety of applications ranging from future processors to ultra-low power Internet-of-things (IoT) based devices. The NanoCAS Lab is equipped with a high performance processing and storage server, workstations, and all necessary EDA tools for modeling, design, and analysis.

The Mixed-Domain Embedded System Laboratory *is equipped for research in the broad area of electronic system design and design automation. Current research projects involve design automation for mixed analog-digital systems and embedded systems for multimedia, sensor network applications and emerging technologies.*

The Mobile Computing and Applications Laboratory (MoCA Lab) focuses on AI/machine learning algorithms, software and infrastructure for healthcare applications, leveraging cutting edge mobile and embedded sensing systems. The lab also conducts research in novel wireless multicast technology, vehicular computing, location based services, and Internet-of-Things. The laboratory has powerful GPU servers, and has access to cloud computing facilities hosted by CEWIT and the University.

The Mobile Systems Design Laboratory conducts research in the broad areas of VLSI system designs for signal processing, communication, and heterogeneous mobile sensors. The laboratory is equipped for design and simulation of complex hardware and software systems.

The Optoelectronics Laboratory possesses the infrastructure for molecular beam epitaxial semiconductor heterostructure growth, advanced material characterization as well as fabrication (clean room) and sophisticated characterization and modeling of optoelectronics devices. The recent research projects include design and development of the novel infrared lasers, light emitting diodes, photodetectors and modulators. The laboratory is actively working on metamorphic epitaxial growth techniques to develop the new class of narrow and ultra-low bandgap alloys and superlattices for long-wave infrared photodetector and other applications.

Spellman Power Electronics Lab is an engineering teaching lab designed to accelerate research and educational programs in alternative energy and power conversion systems.

The Ultra-High-Speed Computing Laboratory conducts research in high performance energy-efficient flux quantum computing and cybersecurity. It is equipped with powerful computing, networking, and storage facilities and advanced CAD tools for superconductor circuit design.

The Wireless and Networking Systems Laboratory conducts research in the area of wireless networking and mobile computing. The lab has extensive computing capabilities, a set of Crossbow sensors, professional sensor test bed development kit, and other equipment for network and system research.

The Wireless Sensor and RFID Network (WSRN) Laboratory focuses on network design and performance analysis for wireless sensor networks and RFID networks. The laboratory is equipped with state-of-art computing equipment, wireless sensor nodes by Crossbow Technologies, Inc. and MotelV (now Sentilla), and RFID equipment. Current projects include novel RFID Tag Identification algorithms, RFID anti-collision algorithms and Consensus protocols.

The Wireless Sensing and AUTO ID Laboratory (WSAID) - The research at the laboratory focuses on Radio Frequency Identification (RFID), wireless sensor networks, and indoor localization. The lab contains facilities and equipment to carry out cutting edge research and small-scale prototyping and evaluation of technologies in real world scenarios. Current projects at the laboratory include development of a novel UHF RFID

system for enhanced performance, development of indoor localization systems based on technologies such as RFID, WiFi and Zigbee, and development of customized RFID systems for use in healthcare settings.

Requirements for the M.S. Degree in Electrical Engineering

The M.S. degree in the Department of Electrical and Computer Engineering requires the satisfactory completion of a minimum of 30 graduate credits. These requirements may be satisfied by either one of the following options:

I. Non-Thesis Option

1. At least 30 graduate credits with a cumulative and departmental grade point average of 3.0 or better. Among these 30 credits, up to six credits may be from combination of ESE 597, ESE 599, and ESE 698. Only 3 credits of ESE 698 and up to 3 credits of ESE 597 may be used. Any non-ESE course will need prior approval given by the Graduate Program Director before a student can register.

2. Minimum of eight (8) regular courses. Of these eight, at least seven (7) regular courses must be taken in the department; three of the seven must be selected from the following CORE Courses:

ESE 502: Linear Systems

ESE 503: Stochastic Systems

ESE 511: Solid-State Electronics or ESE 538: Nanoelectronics.

ESE 516: Integrated Electronic Devices and Circuits I.

ESE 520: Applied Electromagnetics

ESE 528: Communication Systems or ESE 532: Theory of Digital Communication or ESE 505: Wireless Communications

ESE 545: Computer Architecture

ESE 547: Digital Signal Processing

ESE 554: Computational Models for Computer Engineers

ESE 555: Advanced VLSI System Design

ESE 566: Hardware-Software Co-Design of Embedded Systems or ESE 587: Hardware Architecture for Deep Learning.

3. ESE 597, ESE 599, ESE 697, ESE 698 and ESE 699 are not counted as regular courses in (2). Topics course, ESE 670, can be counted only once as a regular course.

4. At least one (maximum three) credit of ESE 597. Graduate Program Director approval is required (see graduate student guide for details). In exceptional circumstances, the Graduate Program Director can approve a replacement of ESE 597 credit by ESE 599, ESE 699 or ESE 698.

II. Thesis Option

1. Students must inform the department in writing at the end of their first semester if they would like to choose the M.S. Thesis Option.

2. At least 30 graduate credits with a cumulative and departmental grade point average of 3.0 or better. Among these 30 credits, at least six credits of ESE 599, with a maximum of 12 credits total being taken from combination of ESE 597, ESE 599, and ESE 698 and up to 3 credits of ESE 597 may be used. Only 3 credits of ESE 698; may be used. Any non-ESE course will need prior approval given by the Graduate Program Director before a student can register.

3. Minimum of six (6) regular courses. Of these six, at least five (5) regular courses must be taken in the department. Three of these five regular courses must be selected from the following CORE Courses:

ESE 502: Linear Systems

ESE 503: Stochastic Systems

ESE 511: Solid-State Electronics or ESE 538: Nanoelectronics.

ESE 516: Integrated Electronic Devices and Circuits I.

ESE 520: Applied Electromagnetics

ESE 528: Communication Systems or ESE 532: Theory of Digital Communication or ESE 505: Wireless Communications

ESE 545: Computer Architecture

ESE 547: Digital Signal Processing

ESE 554: Computational Models for Computer Engineers

ESE 555: Advanced VLSI System Design

ESE 566 Hardware-Software Co-Design of Embedded Systems or ESE 587: Hardware Architecture for Deep Learning.

4. ESE 597, ESE 599, ESE 697, ESE 698 and ESE 699 are not counted as regular courses in (3). Topics course, ESE 670, can be counted only once as a regular course.

5. At least one (maximum three) credit of ESE 597. Graduate Program Director approval is required (see graduate student guide for details). In exceptional circumstances, the Graduate Program Director can approve a replacement of ESE 597 credit by ESE 599, ESE 699 or ESE 698.

6. Students must satisfactorily complete a thesis (see graduate student guide for details).

Requirements for the Ph.D. Degree in Electrical Engineering

A. Major and minor area requirements

1. Major area requirement is satisfied by taking minimum of three (3) courses from a selected major area with minimum GPA of 3.5. See Graduate Student Guide for preapproved lists of courses for each area.

2. Minor area requirement is satisfied by taking courses from other areas (different from the selected major area) with minimum GPA of 3.0. Students with BS degree are required to take two (2) courses from other areas (one or two areas) while students with MS degree are required to take one (1) course.

B. Course Requirements

1. A minimum of 14 regular courses (42 regular graduate course credits) beyond the BS degree (including courses taken to satisfy major and minor requirements). The choice must have the prior approval of the designated faculty academic advisor. Any non-ESE course will need prior approval given by the Graduate Program Director before a student can register.
2. The ESE 697 Practicum in Teaching (3 credits) is required to satisfy the teaching requirement. Students must be advance to candidacy in order to take this course.
3. At least 15 credit hours of ESE 699 for conducting focused research under faculty supervision.
4. The courses ESE 597, ESE 598, ESE 599, ESE 698, and ESE 699 are not counted as regular courses.
5. Courses presented under the title ESE 670 Topics in Electrical Sciences that have different subject matters, and are offered as formal lecture courses, are considered different regular courses but may not be counted more than twice.
6. Prior MS degree in ECE or related area can reduce the course requirements down to six (6) regular courses.

C. Advancement to Candidacy

After successfully completing all major/minor/course requirements (except ESE 697) the student is eligible to be recommended for advancement to candidacy. This status is conferred by the dean of the Graduate School upon recommendation from the chairperson of the department.

It is strongly recommended that doctoral students Advance to Candidacy within 2.5 years if admitted with a BS degree (after earning 42 regular course credits), or within 1.5 years if admitted with an MS degree (after earning 18 regular course credits).

D. Preliminary Examination

A student is recommended to pass the preliminary examination within 1.5 years after advancement to candidacy. Both a thesis topic and the thesis background area are emphasized. Students must pass the Preliminary Examination at least ONE year prior to their Defense. See Graduate Student Guide for details.

E. Dissertation

The most important requirement for the Ph.D. degree is the completion of a dissertation, which must be an original scholarly investigation. The dissertation must represent a significant contribution to the scientific and engineering literature, and its quality must be compatible with the publication standards of appropriate and reputable scholarly journals.

F. Approval and Defense of Dissertation

The dissertation must be orally defended before a dissertation examination committee (normally in three - four years after satisfying the major and the minor requirements), and the candidate must obtain approval of the dissertation from this committee. The committee must have a minimum of four members (at least three of whom are faculty members from the department), including the research advisor and committee chair, and at least one person from outside the department. (Neither the research advisor nor the outside member may serve as the chair). Within the committee there must be a member with no conflict of interest in relationship to the student (including intellectual, personal, financial, etc.) On the basis of the recommendation of this committee, the dean of engineering and applied sciences will recommend acceptance or rejection of the dissertation to the dean of the Graduate School. All requirements for the degree will have been satisfied upon the successful defense of the dissertation.

G. Residency Requirement

The student must complete two consecutive semesters of full-time graduate study. Full-time study is 9 credits minimum per semester.

H. Time Limit

All requirements for the Ph.D. degree must be completed within seven (7) years after completing 24 credits of graduate courses in the department.

Certificates

1. Networking & Wireless Communications Certificate

Matriculated students only.

Networking and wireless communications are key technologies in today's technological world. Networks such as the Internet as well as telephone, cable and wireless networks serve to interconnect people and computers in a ubiquitous and cost effective way. The area of wireless communications in particular has grown rapidly in recent years and has utilized networking technology to be successful. There is a large industrial base involving networking and wireless communications in terms of equipment and software providers, service providers and end users. Moreover this technology has made the average consumer's life more productive, flexible and enjoyable.

The Stony Brook Certificate Program in Networking and Wireless Communications is designed to give matriculated students validated graduate level instruction in this area of much recent interest. The program can be completed in a reasonable amount of time as it involves only four courses. These are regular Stony Brook graduate level courses taught by Stony Brook faculty. The SUNY approved certificate program can be tailored to the needs of the individual student. Courses used for the certificate program can also be used toward the MS or PhD degree by matriculated students.

To receive the Stony Brook Certificate in Networking and Wireless Communications, a student must complete FOUR required courses as specified below, with at least a B grade in each course.

At least ONE course from the following:

- ESE 505: Wireless Communications
- ESE 506: Wireless Network

At least ONE course from the following:

- ESE 532: Theory of Digital Communications
- ESE 546: Networking Algorithms and Analysis
- ESE 548: Computer Networks

In addition to the above, if needed, courses may be selected from:

- ESE 503: Stochastic Systems
- ESE 504: Performance Evaluation of Communication and Computer Systems
- ESE 522: Fiber Optic Systems
- ESE 528: Communication Systems
- ESE 531: Statistical Learning and Inference
- ESE 536: Switching and Routing in Parallel and Distributed Systems
- ESE 543: Mobile Cloud Computing
- ESE 544: Network Security Engineering
- ESE 547: Digital Signal Processing
- ESE 550: Network Management and Planning
- ESE 552: Interconnection Networks

2. Engineering Machine Learning Systems

Matriculated students only.

The Engineering Machine Learning Systems certificate program educates about the mathematical theory, fundamental algorithms, and optimized engineering of computational learning systems used in real-world, big data applications. Students will also study modern technologies used in devising such data systems, including software tools, architectures, and related hardware structures. Comprehensive, hands-on student projects on designing, implementing, and testing real-world learning systems are part of the certificate program. The certificate program includes a total of four courses: three required courses and one elective course.

To receive the Stony Brook certificate in the Engineering Machine Learning Systems, a student must be currently enrolled in an MS or PhD program in the Electrical and Computer Engineering Department and must complete four courses as specified below, with at least a B grade in each course.

Foundations (1 required): ESE 503 Stochastic Systems

Fundamental Methods (2 required): ESE 588 Fundamentals of Machine Learning
ESE 589 Learning Systems for Engineering Systems

Applications (1 out of three electives): ESE 568 Computer and Robot Vision
ESE 587 Hardware Architectures for Deep Learning,
ESE 590 Practical Machine Learning
BMI 511/ESE 569 Translational Bioinformatics

To apply for the Engineering Machine Learning Systems Certificate Program, a student must complete the "Permission to Enroll in a Secondary Certificate Program" form (which requires some signatures) from the Graduate School website, and submit it within the first week of the semester when they start the certificate.

3. Engineering the Internet of Things

Matriculated students only.

The Engineering the Internet-of-Things certificate program provides the fundamental principles, popular technologies and optimized engineering of Internet-of-Things applications and systems. Students gain a broad set of skills and knowledge for IoT development and innovation, including sensors and interfaces, RF communication, microcontroller and embedded systems, wireless radios, network protocols, cloud services and security techniques. Students learn how to design, implement and evaluate IoT systems and applications through hands-on projects on popular embedded system hardware. The certificate program includes a total of four courses: three required courses and one elective course.

To receive the Stony Brook certificate in the Engineering the Internet-of-Things, a student must be enrolled in an MS or PhD program in the Electrical and Computer Engineering Department and must complete four courses as specified below, with at least a B grade in each course.

Foundations (1 required): ESE 566 Hardware Software Co-design for Embedded Systems

Basic Skills and Knowledge (2 required): ESE 506 Wireless Network
ESE 525 Modern Sensors in Artificial Intelligence Applications

Cloud and Security (1 out of two electives): ESE 543 Mobile Cloud Computing
ESE 544 Network Security Engineering

To apply for the Engineering the Internet-of-Things Certificate Program, a student must complete the "Permission to Enroll in a Secondary Certificate Program" form (which requires some signatures) from the Graduate School website, and submit it within the first week of the semester when they start the certificate.

Faculty of Electrical and Computer Engineering Department

Distinguished Professors

Djuric, Petar M., Chairperson, Ph.D., 1990, University of Rhode Island: Signal analysis, modeling and processing; wireless communications and sensor networks.

Yang, Yuanyuan, Ph.D., 1992, Johns Hopkins University: Wireless and mobile networks, cloud computing, data center networks, optical networks, high speed networks, parallel and distributed computing systems, multicast communication, high performance computer architecture, and computer algorithms.

Professors

Bugallo, Monica, Ph.D., 2001, Universidade da Coruna (Spain): Statistical signal processing with the emphasis in the topics of Bayesian analysis, sequential Monte Carlo methods, adaptive filtering, and stochastic optimization.

Doboli, Alex, Ph.D., 2000, University of Cincinnati: VLSI CAD and design, synthesis and simulation of mixed analog-digital systems, hardware/software co-design of embedded systems, and high-level synthesis of digital circuits.

Hong, Sangjin, Ph.D., 1999, University of Michigan: Low-power VLSI design of multimedia wireless communications and digital signal processing systems, including SOC design methodology and optimization.

Parekh, Jayant P., Ph.D., 1971, Polytechnic Institute of Brooklyn: Microwave acoustics; microwave magnetics; microwave electronics; microcomputer applications.

Zhang, Peng, PhD, 2009, University of British Columbia, Vancouver, Canada: Power system, programmable microgrids, networked microgrids, software-defined distribution network, cyber-resilient power grid, formal methods, reachability analysis, power system stability and control.

Robertazzi, Thomas G., 1981, Princeton University: Computer networking; grid computing; performance evaluation; parallel processing; e-commerce technology.

Shamash, Yacov, Ph.D., 1973, Imperial College of Science and Technology in London, England: Control Theory & Systems, Energy Systems, and Industry/University Partnerships.

Short, Kenneth L., Ph.D., 1973, University at Stony Brook: Digital system design; microprocessors; instrumentation.

Shterengas, Leon, Graduate Program Director, Ph.D. 2004, Stony Brook University: Semiconductor photonic devices, nanofabrication, molecular beam epitaxy.

Subbarao, Murali, Ph.D., 1986, University of Maryland: Computer vision; image processing; pattern recognition.

Associate Professors

Dhadwal, Harbans, Ph.D., 1980, University of London, England: Laser light scattering; fiber optics; optical signal processing and instrumentation.

Donetski, Dmitri, Ph.D.. 2000, Stony Brook University: Design and technology of optoelectronic devices and systems including photovoltaic and photoconductive detectors, diode lasers and diode laser arrays.

Dorojevets, Mikhail, Ph.D., 1988 Siberian Division of the USSR Academy of Sciences, Novosibirsk: Computer architectures, systems design.

Eisaman, Matthew, Ph.D., 2006 Harvard University: Photovoltaic devices, especially light trapping nanostructures for improved solar cell efficiency, and spatial variations at the nanoscale.

Gorfinkel, Vera, Ph.D., 1980, A.F. Ioffe Physical-Technical Institute, St. Petersburg, Russia: Semiconductor devices, including microwave and optoelectronics, DNA sequencing instrumentation, single photon counting techniques.

Kamoua, Ridha, Undergraduate Program Director, Ph.D., 1992, University of Michigan: Solid-state devices and circuits; microwave devices and integrated circuits.

Lin, Shan, Ph.D., 2010, University of Virginia: Cyber physical systems, networked information systems, wireless networks, sensing and control systems.

Luo, Fang, Ph.D., 2010, Huazhong University of Science and Technology, Wuhan, China (Jointly supervised by Virginia Tech, Blacksburg, VA, USA): Power electronic devices and circuits, energy conversion systems.

Milder, Peter, Ph.D. 2010, Carnegie –Mellon University: Digital hardware design, generation, and optimization focusing on signal processing, computer vision, and related domains; design for FPGA.

Salman, Emre, Ph.D. 2009, University of Rochester: Nanoscale integrated circuit design, emerging technologies for future electronic systems, highly heterogeneous integrated systems, digital and mixed-signal circuits.

Stanacevic, Milutin, Ph.D., 2005, Johns Hopkins University: Analog and mixed-signal VLSI integrated circuits and systems; adaptive Microsystems; implantable electronics.

Suchalkin, Sergey, Ph.D., 1998, Ioffe Physical Technical Institute, Russia: Design and development of optoelectronic devices. Far- and Mid-infrared spectroscopy of solids. Physics of semiconductors and nanostructures.

Tang, K. Wendy, Ph.D., 1991, University of Rochester: Interconnection networks, parallel computing, and neural networks.

Wang, Xin, Ph.D., 2001, Columbia University: Mobile and ubiquitous computing, wireless communications and networks, grid and distributed computing, advanced applications and services over Internet and wireless networks.

Ye, Fan, Ph.D., 2004, UCLA: Mobile computing/sensing systems & applications, indoor localization and floor plan reconstruction, internet-of-things and sensor networks.

Zhao, Yue, Ph.D., 2011, UCLA: Smart energy systems, renewable energy integration, electricity market, infrastructure security, sensing and signal processing, optimization theory, information theory, communication networks.

Assistant Professors

Liu, Ji, *Ph*.D., 2013, Yale University: Distributed control and computation, multi-agent systems, social networks, epidemic networks, and power networks.

Professors of Practice and Instructional Specialists

Westerfeld, David, PhD: Design and characterization of high-performance mid-infared semiconductor light sources (LEDs and lasers).

Gouzman, Michael, PhD: Semiconductor devices, including microwave and optoelectronics.

Affiliated Faculty

Hassan Arbab, M., Assistant Professor: Terahertz emission, detection and imaging technologies and their applications in biophotonics, medical imaging, non-destructive testing, material characterization and stand-off detection of chemicals.

Goldan, Amir H., Assistant Professor: X-Ray and PET Imaging, Digital Radiological Imaging Detectors, Single Photon Counting for Medical Imaging, Detector Modeling, Fabrication, Characterization and Instrumentation, Avalanche Amorphous Selenium Detectors, Quantum Mechanical Modeling of Charge Transport, Noise-Free Avalanche Detectors.

DeLorenzo, Christine, Associate Professor: Biomarkers of Major Depressive Disorder, Antidepressant Treatment Response Prediction, Multimodal Brain Imaging, and PET Radioligands.

Liang, Jerome, Professor: Low-dose computed tomography image reconstruction, Quantitative image reconstruction for single photon emission computed tomography, High resolution positron emission tompgraphy image reconstruction, Segmentation of tissue mixtures from multi-spectral images, Computer aided detection of abnormality and diagnosis on the detected abnormality, Development of virtual colonoscopy systems.

Park, Memming, Assistant Professor: Memming Park designs statistical models and machine learning methods specialized for analyzing neural time series. He aims to understand how information and computations are represented and implemented in the brain, both at a single-neuron and at the systems level. His group collaborates with several experimental labs on important problems in neuroscience, such as sensory coding, recovery from coma, and perceptual decision-making.

Wang, Daifeng, Assistant Professor: Data mining and machine learning in bioinformatics and biomedical data science; Computational systems biology; Computational social networks

Adjunct Faculty

Chi Chen: Software Engineering, Computational Models, Feedback Control Stabilization

Gianluigi De Geronimo: Development of advanced low-noise application-specific integrated circuits for sensors from concept to transistor-level design, physical layout and characterization, frequency- and time-domain noise analysis, optimum analog and digital filters, high-precision signal processing, systems-on-chip, and semiconductor device physics

Timothy Driscoll: Electric Power Systems; Renewable Energy Resource Systems; Advanced Power Systems; Smart Grid; Electric Vehicles

Carlos Fernando Gamboa: Computer Networks and Scheduling Theory; Data Intensive Distributed Systems; Database Management Systems

Yasha Karimi: Medical device technologies, Internet of Things (IoT), Wearable Electronics, Ultra-low power Circuit and System Design

Dmitri Gavrilov: Signal processing, neural networks, embedded systems.

Dmytro Gudkov

Shaorui Li

Vibha Mane: Stochastic Modeling of Biological Networks; Statistical Machine Learning; Signal Processing, Detection and Estimation

Ronald Marge: Technical communications

Tatiana Tchoubar

Donna Tumminello: Technology Commercialization; Entrepreneurship

Dantong Yu: Data mining, high performance computing and networks

NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.