



### THE DEPARTMENT

Being a highly interdisciplinary department, we build on a strong foundation of physical and mathematical sciences, a broad knowledge of engineering principles and techniques, and an understanding of how technologies can help us shape the future. We offer a broad education and in-depth training to help our graduates succeed in their professional career. Our faculty engages in a long-standing tradition of excellent teaching, innovative research, and valuable public service.

Our twenty-eight full-time faculty do research on the cutting edge of Electrical Engineering. Research is conducted in the areas of Signals, Communications and Networking; Solid State Electronics; Optics and Photonics; and Energy Systems. These research programs receive support from federal agencies (such as the National Science Foundation and the US Department of Defense), the State of New York, industry (including National Grid, and Intel), and the University. Our graduate student body numbers over 300, and is enhanced by student representation from the United States and around the world.

### DEGREES OFFERED/SPECIALIZATIONS

The Electrical Engineering Department at UB offers Ph.D., M.S. and M.Eng. degree programs in Communications, Networking, and Signal Processing, in Solid State Electronics, in Optics and Photonics, and in Energy Systems. The research topical areas under each specialization are as follows:

### SIGNALS, COMMUNICATIONS AND NETWORKING

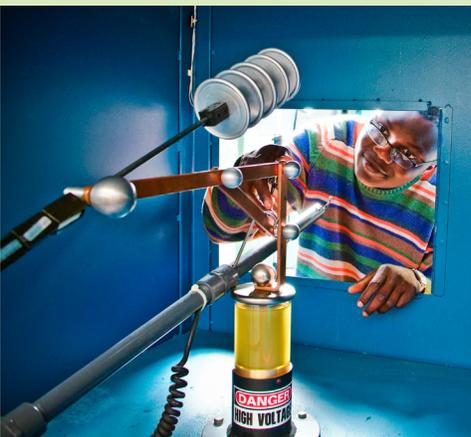
The Signals, Communications and Networking area focuses on the design, characterization and analysis of all aspects of communication links and networks. Specific areas of research include:

- Communications and networking theory (signal design, modulation and coding techniques; receiver optimization; modeling and optimization of networks; resource allocation and scheduling)
- Wireless communications and network systems (cognitive radio networks; multi-user/multi-access links; spread-spectrum communications; physical and network layer security; underwater and underground communications and networking)
- Multimedia signal processing and communications (small sample support adaptive signal processing; video communications; compressed sensing/compressive sampling; covert communications; steganography/steganalysis)
- Medical image processing (magnetic resonance imaging; inverse scattering)
- Radar signal processing (array radar; space-time adaptive processing; compressive sampling radar; synthetic aperture radar)
- Multi-antenna (MIMO) signal processing and communications (space-time coding; cooperative communications; MIMO protocol optimization)
- Information theory and coding (interference channels; low-density parity check codes; sequences and multiplexing)
- System optimization theory and practice (convex optimization in signal processing and communications; game theory; variational inequalities; distributed optimization; detection and estimation)

### SOLID STATE ELECTRONICS

The Solid State Electronics group focuses on the development of electronic devices and circuits with broad application to state-of-the-art technologies. Specific areas of current research interest in solid state electronics include:

- Semiconductor devices (Schottky devices, solar cells, photodetectors, microwave devices)
- Semiconductor heterostructures (transport and device physics, ultra-high frequency GaN devices, thermoelectric and optoelectronic devices)
- Nano materials, devices and systems (synthesis, fabrication, characterization and physics, carbon nanotubes, nanobiosensors)
- Nanomagnetoelectronics (spin and electron-wave based approaches)
- Nanoscale device physics and quantum circuit theory (modeling and simulation of carrier phenomena, quantum computing and measurement problems)
- Analog VLSI (CMOS sensors and analog circuits, electronic routing & packaging)
- Fabrication and characterization (electron beam lithography, solid-state THz spectroscopy)
- MEMS, BioMEMS (world-to-chip interfacing and packaging)
- Aerosol mechanics, and Plasma dynamics



### OPTICS AND PHOTONICS

The Optics and Photonics area focuses on the fundamental aspects of light-matter interactions in various optical media and their applications for designing the next generation of ultra-fast and ultra-compact photonic devices and systems. Specific areas of current research interest in optics and photonics include:

- Nanophotonics, Nanostructured optical materials, devices and systems
- Plasmonics, Metamaterials, and Photonic Integrated Circuits
- Nonlinear optics
- Singular and quantum optics
- Light filamentation science
- Quantum and classical chaos
- Photonic bandgap structures and Photonic crystal fibers
- Photovoltaics
- Fiber optics and Optical Communications Systems
- MEMS, BioMEMS, Confocal microscopy, Biomedical imaging
- Micro-tomography and Radiation (gamma, proton, x-ray)
- Computational Physics/multi-disciplinary modeling
- Quantum information processing
- Biophotonics, Hybrid inorganic / organic materials and devices
- Biosensing and environmental sensing
- Biomagnetics, bioseparation, drug targeting
- Optofluidics
- Secure communications
- Photoacoustic imaging
- Ultrasound-modulated optical tomography
- Fluorescence imaging
- Laser speckle contrast imaging

### ENERGY SYSTEMS

The Energy Systems area focuses on various aspects of energy generation, energy storage and energy transmission – as well as energy distribution applied to traditional electric grids. It is also engaged in cross disciplinary research with medicine, defense and communications. Specific areas of research include:

- Insulation coordination, nano-dielectrics, reliability and control of (aged/stressed) autonomous and/or supervised devices and systems (nano to mega scale size)
- Electronic circuits, devices and systems for processing electrical power, sensors
- Energy systems, smart grid, electricity markets, power infrastructure, electric power quality and economics, electrical measurements, demand response and demand side management, and flexible reliable intelligent electrical energy delivery-systems, renewable resources and integration, plasma diagnostics, plasma modeling, plasma processing, bio-engineering applications of plasmas.

### RESEARCH FACILITIES

In the Fall of 2011, the Department of Electrical Engineering moved into Davis Hall, a new green building with state-of-the-art research laboratory facilities, teaching labs and lecture halls, designed to support collaboration among faculty and students within the department, across the university and with other institutions. The new building houses ergonomically designed office spaces, conference rooms, smart rooms, and a brand new, Class 1000 cleanroom (approximately 5,000 sq. ft.). Davis Hall is home to the following research laboratories:

- Wireless Communication Systems and Networks Lab
- Secure Communications Lab
- Signal Processing and Communication Electronics Lab
- Cognitive Communications and Networking Lab
- Testing and Characterization Lab
- SMALL (Sensors + Microactuators Learning Lab)
- Electronic Materials Lab
- Analog VLSI and Sensors Laboratory
- Advanced Spectroscopic Evaluation Laboratory
- Nanophotonics and Nonlinear Optics Lab
- Underwater Communications and Networking Lab
- Advanced Power Sources Lab
- Nano-Optics and Biophotonics
- Embedded Systems Lab

Additional EE laboratories across campus include:

- Energy Systems Institute,
- Multidisciplinary Nano- and Microsystems lab
- Power Center for Utility Explorations

### FACULTY AWARDS/PROFESSIONAL RECOGNITION

- SUNY Distinguished Professor: Prof. Vladimir Mitin
- SUNY Chancellor's Award for Excellence in Teaching: Prof. Alex Cartwright, Prof. Dimitris Pados
- SUNY Chancellor's Award in Scholarship and Creative Activities: Prof. Jonatha Bird, Prof. Stella Batalama
- Fellow, Royal Microscopical Society, UK: Prof. P.C. Cheng
- Fellow, IEEE: Prof. Vladimir Mitin
- Fellow, Optical Society of America: Prof. Natasha Litchinitser
- Prolific Inventor Award, Society for Imaging Science & Tech: Prof. Ed Furlani
- University at Buffalo Exceptional Scholar Awards for Sustained Achievement: Prof. Alex Cartwright, Prof. Jonathan Bird, Prof. Dimitris Pados, Prof. Natalia Litchinitser
- NSF CAREER Award: Prof. Leslie Ying
- IEEE Transactions on Neural Networks Best Paper Award: Prof. Dimitris Pados
- IEEE ICC Best Paper Award: Prof. Dimitris Pados and Prof. Weifeng Su
- IEEE ICT Best Paper Award: Prof. Dimitris Pados
- IEEE Outstanding Teaching Award: Prof. Jennifer Zirnheld
- Member, American Association for the Advancement of Science: Prof. Vladimir Mitin

### GENERAL FINANCIAL SUPPORT INFORMATION

Graduate students may apply for a variety of fellowships and scholarships including Teaching Assistantships (TA), Tuition Scholarships (TS), or Research Assistantships (RA). TA and TS awards are made to students via a department-wide selection process while RA awards are made directly by individual professors. Some fellowships and scholarships are limited to current UB students.



### ADMISSIONS INFO

#### ***Where can I find graduate admission requirements and graduate application procedures?***

Graduate admission requirements and application procedures can be found on the EE website: [www.engineering.buffalo.edu/electrical/grad](http://www.engineering.buffalo.edu/electrical/grad)

***How can I apply for graduate scholarships and assistantships?*** Information about graduate scholarships and assistantships can be found on the EE website: [www.engineering.buffalo.edu/electrical/grad](http://www.engineering.buffalo.edu/electrical/grad)

#### ***Do I need any special ID information on supporting documents submitted to match my online application?***

No. Documents are filed by Last Name, First Name, and Date of Birth. Student applicants are requested to ensure that the name used on supporting documents as well as the online application is consistent with the name that appears in their passport or social security card.

#### ***How do I know if my application is complete?***

An application file is complete unless the student applicant receives communication from the department asking for additional materials.

#### ***When will the admission decision be made?***

Admission decisions are usually made on or before March 31 for Fall admissions, and on or before October 31 for Spring admissions.

#### ***How will I be notified of the admission decision?***

Admission decisions will be communicated to applicants via email.

### SCHOOL AND UNIVERSITY

A member of the prestigious Association of American Universities, the University at Buffalo stands in the first rank among the nation's research-intensive public universities. UB Engineering is New York State's largest and most comprehensive public school of engineering. Students may pursue master's and doctoral degrees in the departments of Biomedical Engineering; Chemical and Biological Engineering; Civil, Structural, and Environmental Engineering; Computer Science and Engineering; Electrical Engineering; Industrial and Systems Engineering; and Mechanical and Aerospace Engineering. In the top 15 percent of the nation's 300 engineering schools, UB Engineering offers a wide variety of excellent instruction, research opportunities, resources, and facilities to its students.

## CONTACT US

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