Graduate Programs
Department of Electrical & Computer Engineering
University of Massachusetts Dartmouth
For more information

about the university, the Department of Electrical & Computer Engineering, and our graduate programs, you can—

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  ECE Graduate Program Director
  508.999.8534

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For an application,

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University of Massachusetts Dartmouth
285 Old Westport Road
North Dartmouth, MA 02747
508.999.8000
Located along the picturesque coastline of southeastern Massachusetts between Narragansett Bay and Cape Cod, UMass Dartmouth is a highly respected university with strong undergraduate programs in liberal arts, business, science, engineering, nursing, and the visual arts. US News and World Report has consistently ranked UMass Dartmouth as a top public regional university in its America’s Best Colleges publication.

UMass Dartmouth also offers mature graduate programs, granting masters and doctoral degrees in science and engineering. For those who seek an advanced degree, the graduate programs provide a contemporary, distinctive education that prepares its graduates for fields that are challenging and continually changing.
The Department of Electrical and Computer Engineering offers three graduate degree programs:

- **Master of Science in Electrical Engineering**

- **Master of Science in Computer Engineering**

- **Doctor of Philosophy in Electrical Engineering**, with an option in Computer Engineering.

The key technical and research areas in electrical and computer engineering are:

- Signals and systems;
- Applied acoustics;
- Applied electromagnetics;
- Electronics and solid-state devices;
- Computer systems.

Unique within the UMass system, and offered at the Dartmouth campus, is the marine emphasis. The focus on the marine applications is supported by the Department of Electrical and Computer Engineering with specialized courses, as well as master’s thesis and Ph.D. dissertation research.

The department has more than 20 full-time faculty, who teach approximately 80-100 graduate students within the department. Professors are experts in an impressive variety of fields, and are engaged in notable research ventures that are supported by public and private funding.

Our students bring to the program a solid educational foundation, keen analytical and research skills, and an eagerness to join faculty in exciting, innovative research ventures.

All of our programs offer small classes, a diverse faculty who are accessible to the students, and well-supported research facilities that support state-of-the-art learning and research experiences. Courses are scheduled conveniently - sensitive to students’ work responsibilities - so students can enroll on either a full-time or part-time basis.

Financial assistance is available on a competitive basis to full-time graduate students. There are also opportunities for teaching or research assistantships within the department. Students can also receive financial aid through fellowships or positions in other university departments.

For students wishing advanced training without a degree, there are 15-credit graduate certificate programs in: electrical engineering systems, communications, digital signal processing, acoustics, and computer systems engineering.
**Master of Science in Electrical Engineering**

provides the foundation that enables graduates to either continue their studies further, or to succeed at an advanced level in industry. The program incorporates flexibility and adaptability, so students can concentrate on the areas that most interest them.

The required courses within the curriculum provide breadth of knowledge; depth is added with the selection of an area of specialization or master’s thesis research.

Specializations are available in signals and systems; applied acoustics; applied electromagnetics; and electronics and solid-state devices.

**Master of Science in Computer Engineering**

gives graduates the knowledge that will enable them to continue their studies, or assume a high-level position in industry. Because of the program’s flexibility, students are able—and are encouraged—to pursue studies in their individual areas of interest.

The program’s required courses give students a substantial foundation, which is complemented and bolstered through selection of specialized courses or master’s thesis research.

Specializations are available in database systems, networks, distributed computing, artificial intelligence, and fault tolerant computing.

**Doctor of Philosophy in Electrical Engineering**

gives students the education they need to be researchers and leaders in their fields of specialization.

The program combines a flexible structure of formal coursework, independent study, and research projects in order to provide a quality, distinctive education.

The focus of the PhD program is an individualized curriculum that prepares the student for doctoral dissertation research. The dissertation is an original scholarly contribution to the research literature of the field, and represents the culmination of the student’s academic career.

The program offers opportunities for graduate studies in the areas of signal processing; sensors; communications; antennas and electromagnetics; database systems; intelligent systems; networking; distributed computing; fault tolerant computing; microwave and solid state electronics; remote sensing; wireless communications; control and tracking systems; and estimation theory.
**Signals & Systems**

**Dr. Chi Hau Chen**
conducts research in the areas of image/signal processing, machine vision, pattern recognition, time series analysis and neural networks. Current projects include:

- semiconductor wafer inspection;
- ultrasonic nondestructive evaluation; and
- remote sensing information processing.

Dr. Chen has been with the university since 1968 and is a Life Fellow of the IEEE. He also directs the Ultrasonic NDE Laboratory at the university's Advanced Technology & Manufacturing Center.

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**Dr. Antonio H. Costa**
conducts research in time-varying signal processing. His efforts have led to several contributions in time-frequency signal analysis and synthesis. He has successfully designed novel and versatile time-frequency representations that can perform well in many signal scenarios, including speech. His areas of interest include:

- high resolution spectral analysis;
- adaptive time-frequency representations; and
- applications of signal processing techniques to biological signals.

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**Dr. Steven C. Nardone**
conducts research on estimation theory with specific applications to nonlinear state estimation. His research has addressed:

- sonar tracking problems;
- observability of nonlinear systems;
- chaotic systems; and
- establishing performance bounds on estimation of tracking processes.

His most recent research is in the areas of fuzzy logic control, approximate reasoning, and fuzzy systems.

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**Dr. Karen L. Payton**
conducts research in the processing of acoustic and speech signals. Projects include:

- predicting the intelligibility of speech degraded by room acoustics and/or reduced capabilities of a listener; and
- comparing computer simulations of peripheral auditory processing with physiological data.

Her work is supported by the National Institutes of Health.

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**Dr. Dean J. Schmidlin**
conducts research in the areas of linear shift-variant systems and inverse problems. Current areas of interest include:

- realization of irrational transfer functions;
- modeling of fractional-order signals from their ramp cepstra; and
- nonlinear optimization and mathematical programming.

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*Time frequency response of simulated whale-like sounds.*
Drs. David A. Brown and Boris Aronov conduct research in the area of marine and engineering acoustics. Students have an invaluable opportunity to supplement their formal coursework with practical training and experience in building and testing transducers for:

- underwater communication modems;
- ship sonar transducers and arrays;
- specialized underwater sensors; and
- acousto-optic devices.

The group is funded by the Office of Naval Research and various local ocean engineering firms.

Dr. John R. Buck conducts research in the area of signal processing and its application to problems in underwater acoustics, including marine mammal bioacoustics and array processing. His recent research includes work on:

- performance limits for passive sonar;
- the information entropy of humpback whale songs;
- effects of low frequency noise on migrating grey whales; and
- a beam-forming video recorder for studying dolphin behavior.

Dr. Buck directs the School for Marine Science and Technology’s Acoustic Signal Processing Lab, funded through the Office of Naval Research and the National Science Foundation.

UMass Dartmouth acoustic wave tank located at the School of Marine Science and Technology.
Dr. Dayalan Kasilingam conducts research in the areas of radar remote sensing, wireless communications, applied electromagnetics and information extraction. Current projects relate to:

- information extraction from remotely sensed images;
- radar scattering from rough surfaces;
- multiple input/multiple output systems in wireless communications;
- adaptive beamforming; and
- biomedical image reconstruction.

Dr Kasilingam is the co-director of the Telecommunications Laboratory within the Advanced Technology and Manufacturing Center. Funding has come from NASA, National Science Foundation, and Office of Naval Research.

Dr. Branislav M. Notaros conducts research in applied computational electromagnetics and antennas. Projects include:

- development of highly efficient, accurate electromagnetic analysis methods;
- electromagnetic modeling of cars and aircraft as parts of wireless communication systems; and
- modeling and CAD of antennas and microwave circuits and components for wireless technology.

His research group, supported primarily by the National Science Foundation, is recognized internationally for its contributions to higher order computational electromagnetics.

(above) State-of-the-art anechoic chamber for near-field electromagnetic radiation measurements. 
(below) Analysis of electromagnetic fields due to radiation from vehicular antennas.

Synthetic Aperture Radar (SAR) image of coastal California (courtesy NASA Jet Propulsion Lab, Pasadena, CA.)
Prof. Lester Cory and Prof. Philip Viall conduct research in rehabilitation engineering. They conduct applied research in the areas of:

- rehabilitation engineering;
- augmentative and alternative speech systems; and
- hands-free control of computer systems.

Prof. Cory is the director of the UMass Dartmouth Center for Rehabilitation Engineering. He and his colleagues involve students in the design and implementation of hundreds of custom-fabricated computer systems used by disabled individuals across the nation.

Dr. Gilbert Fain conducts research on the use of light, sound, electronics, and computers to develop measurement and control systems primarily for the underwater environment. His research includes:

- remote sensing of submergent, floating and emergent vegetation in waterways;
- passive and active measurements of plant density over time;
- underwater acoustic tracking and communication systems; and
- remote measurements of plant stress in cranberry bogs.

His work is supported by the U. S. Navy, the state of Massachusetts, and private industry.

Dr. David P. Rancour conducts research on solid state circuits and devices. Current areas of interest include:

- realization of complex neural network algorithm in analog Si CMOS;
- experimental investigation of quantum signaling and the theoretical quantum potential; and
- development of novel non-contact technology to assist the severely disabled.

Dr. Rancour is the ECE department liaison to Mentor Graphics Corporation, provider of software in support of VLSI classes; and liaison to MOSIS, provider of fabrication services for VLSI classes.
Dr. Paul J. Fortier
conducts research in database systems. His research areas are:

- applications of data mining and knowledge discovery to agriculture, environmental and health-care;
- physical/biological ocean assessment and management;
- database systems, transactions and language design and standardization;
- real-time systems architectures, database systems, networks and operating systems; and
- computer systems performance evaluation.

Facilities supporting this research include the Computer Engineering Information Technology Research Laboratory. Dr. Fortier’s research has been supported by the National Science Foundation, Environmental Protection Agency, U.S. Navy, state of Massachusetts, and major U.S. corporations.

Dr. Hong Liu
conducts research in computer networks and security; compilers; and programming languages. Her research includes:

- Internet quality of service for multimedia and distributed computing;
- real-time applications;
- vulnerability assessment for internet security; and
- computer network management.

Dr. Liu’s research utilizes specialties on database systems, distributed computing and real-time processing, multimedia communications, reliability and safety, programming language design, and compiler optimization.

Dr. Howard E. Michel
conducts research in the area of artificial intelligence and neural networks. Current projects include:

- classification of multi-spectral satellite image data using improved NRBF neural networks;
- developing a CMOS high frequency AC VLSI implementation of a simple artificial neuron;
- fish-quality analysis using artificial neural networks and spectroscopic data;
- artificial neural network enhanced FT-IR biosensor;
- developing a decision aid for acute care nursing; and
- developing distributed, collaborative, intelligent agents.

This research has been funded by the National Science Foundation, and National Oceanic and Atmospheric Administration, and through a Cooperative Research and Development Agreement with the Army Research Laboratory providing access to its super computing facility in Aberdeen Proving Ground, MD.

Dr. Theophano Mitsa
conducts research in Internet computing. Areas of interest include:

- knowledge-based systems;
- intelligent agents; and
- expert system frameworks.

Dr. Mitsa has been supported by the National Science Foundation, the Whitaker Foundation, and Hewlett-Packard.
Dr. Liudong Xing conducts research in fault tolerant computing. Current research projects include:

- hardware and software reliability engineering;
- fault tolerant computing; and
- computer simulation and modeling.

Her research is developing techniques for modeling, analyzing, and predicting reliability and performance of computer-based systems in many critical applications such as computer networking, sensor networks, telecommunications, aerospace, and power systems.
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