The Department of Electrical Engineering has approximately 18 faculty members, 320 undergraduate students and 60 graduate students, with research expenditures averaging $1 million per year.

The Department has a long tradition of top-notch research in information transmission, storage and processing. In the 1970s, its research produced the well-known ALOHA network, the first wireless packet network.

The Department counts many outstanding graduates who have been active in both academia and industry, including four IEEE Fellows and high-profile industry leaders. Several of its faculty have commercialized research with startup companies, and others have received numerous awards including best-paper honors in journals and conferences proceedings, the NSF Career/NIH/NYI Award, the UH Regents’ Medal for Excellence in Research and a Medal for Excellence in Teaching.

The Department is organized into three research tracks:

**COMPUTERS** Research areas include optical networks, network security, image processing in 3-D modeling, embedded systems, VLSI CAD, computer architecture, bioinformatics, telemedicine, computational intelligence, and parallel and distributed computing. Faculty members collaborate with the John A. Burns School of Medicine (JABSOM), local high-tech companies, and researchers in the Queen’s Medical Center on NIH-funded projects in image-based diagnostics.

**ELECTROPHYSICS** Research areas include MEMS devices and simulation tools, high-frequency electronic circuits, non-invasive sensing of biomedical signals, semiconductor devices and sensor innovation, antennas, and computational electromagnetics. Present and past faculty have been successful in establishing high-technology start-up companies, and play key roles in the Hawai’i Space Flight Laboratory and the Hawai’i Center for Advanced Communications.

**SYSTEMS** Research areas include wireless communications, information theory, channel coding, information security, magnetic recording, network optimization, control theory, game theory, source coding, machine learning, signal processing, power systems, and smart grids. The Renewable Energy and Island Sustainability (REIS) center was formed in 2009 and is a multidisciplinary research and education center working on cutting-edge problems in renewable energy, sustainability and smart grids.

Graduate programs in electrical engineering

**COMPUTERS**

**ELECTROPHYSICS**

**SYSTEMS**

Graduate Program Chair:

Professor GurDAl ArsLAn

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the qualifying exam.

Every PhD student is required to take a comprehensive examination, consisting of an oral exam given by the entire committee, to ascertain the student’s comprehension of the subject matter.

Students must possess a bachelor’s degree in electrical engineering or its equivalent. Students are required to achieve a broad understanding of electrical engineering fundamentals and a thorough knowledge of specific field under the guidance of a faculty adviser and present a qualifying exam. In addition to the MS course credit requirements, nine credits of 600-level course work in the major track and three credits of 600-level course work in a minor track are required. All PhD students also must participate in a substantial teaching project and demonstrate competence in teaching.

Funding Support
The Department offers a limited number of teaching assistantships, and individual faculty offer research assistantships. These positions usually are available only after enrollment, but students are encouraged to discuss availability with the graduate program chair since they have applied to the program. Prospective students also are encouraged to consult with individual faculty. Please refer to the faculty research guide, available at: www.eng.hawaii.edu/news-publications/publications/

How to Apply
Visit the University of Hawai‘i at Mānoa Office of Graduate Education website, or go directly to: manoa.hawaii.edu/graduate/content/how-apply

Hawai‘i Center for Advanced Communications
The Hawai‘i Center for Advanced Communications (HCAC) is a multidisciplinary research center established by the Hawai‘i legislature and approved by the UH Board of Regents in 2000. With the assistance of the U.S. federal state, and private funding, HCAC continues its mission to be the leading center for innovative research in the broader area of wireless communication and radar technologies through joint research and educational activities that promote national and international collaboration and partnership with industry.

HCAC has developed four state-of-the-art laboratories to support its ongoing research activities, which include advanced miniaturized antenna designs, propagation modeling and characterization of wireless communication and radar systems in real-world indoor channels, digital signal processing for smart antennas, ground penetrating radar technologies for UXO and HD detection and classification, microstrip waveguides for biomedical applications, and the development of radio frequency tunable devices for reconfigurable antennas, cognitive radio, and solar power harvest applications.

The Center has tenured faculty, several full-time researchers, and graduate students working toward their master’s of science and/or doctorate degrees in electrical engineering. Faculty have been recognized with several national and international awards, among them the 2017 IEEE AP-S Distinguished Educator Award, 2013 IEEE MTT-S Distinguished Educator Award, and both the UH Regents’ Medal for Excellence in Research and the UH Regents’ Medal for Excellence in Teaching. All students/visiting postdocs for graduate students must fulfill the requirements of the UH Mānoa Office of Graduate Education, as well as those of the Department of Electrical Engineering.

HCAC is a member of the NSF Industry-University Cooperative Research Center and has international partnerships with The State Key Lab on Microwave & Digital Communications, Tsinghua University, China; The Centre National de la Recherche Scientifique, University of Nice-Sophia Antipolis, Nice, France; Communication Research Centre, York University, Toronto; and the Department of Signal Theory and Communications, Universitat Politècnica de Catalunya, Barcelona, Spain.

Research is funded by federal agencies that include the National Science Foundation, the Army Research Office, Office of Naval Research, DARPA, and others. The Center also has participated in several national and international partnerships to support research initiatives.

Research efforts inside the University, within the local community and 180 graduate students, with external funding of $8.5 million per year. The Department of Electrical Engineering plays a significant role in the broader research interests of the College:

SUSTAINABILITY The College takes inspiration from traditional Native Hawaiian land management systems, once able to sustain large populations, in order to create programs that address the challenges now faced by the islands. Such examples include: building and maintaining renewable energy resources, providing clean drinking water, mitigating the effects of sea-level rise associated with global warming, becoming resourceful recyclers and re-manufacturers, minimizing the need for imported goods and sustaining a pristine environment.

INFRASTRUCTURE IN SUPPORT OF THE ENVIRONMENT Graduates of our College are employed throughout the state to manage all aspects of its environment, from its buildings and roadways, to its harbors, sea defenses and water and waste systems, thus making it imperative that we retain capacity in order to continuously service Hawaii’s future growth.

IT AND CYBER SYSTEMS The College is well known for its contributions to “clean” technologies such as information technology (IT) and communications infrastructure, which will be central to the future of Hawaii’s industry.

RESEARCH CLUSTERS The College also has identified eight cross-cutting research clusters that all departments and centers in the College contribute toward:

• Autonomous Systems and Robotics
• Big Data and Cyber Security
• Biomedical Engineering
• Coastal Infrastructure
• Computer and Computational Engineering
• Sustainable Materials and Manufacturing Technology
• Renewable Energy and Island Sustainability
• Water, Waste and Environmental Engineering

These areas have been chosen to reflect faculty interest and expertise, as well as the evolving needs of Hawaii. They also represent some of the main interests of the College’s collaborators in their research efforts inside the University, within the local community and abroad. The College is especially interested in extending these relationships to federal and mainland companies, U.S. mainland and Asian universities, as well as other potential partners.

The College of Engineering and the University of Hawai‘i at Mānoa

The College of Engineering is a multifaceted institute comprised of approximately 55 faculty members, 950 undergraduate and graduate students, and 180 graduate students, with external funding of $8.5 million per year. The Department of Electrical Engineering plays a significant role in the broader research interests of the College:

• Autonomous Systems and Robotics
• Big Data and Cyber Security
• Biomedical Engineering
• Coastal Infrastructure
• Computer and Computational Engineering
• Sustainable Materials and Manufacturing Technology
• Renewable Energy and Island Sustainability
• Water, Waste and Environmental Engineering

These areas have been chosen to reflect faculty interest and expertise, as well as the evolving needs of Hawaii. They also represent some of the main interests of the College’s collaborators in their research efforts inside the University, within the local community and abroad. The College is especially interested in extending these relationships to federal and mainland companies, U.S. mainland and Asian universities, as well as other potential partners.

PhD Program
Students must successfully complete a minimum of 50 credits in course work beyond the BS. Students entering the PhD program may be granted an equivalence of up to 30 credits earned as part of the student’s MS program, which may include up to nine credits for previous MS thesis work. PhD students are required to specialize in a major track (computers, electrophysics, or systems) and show competence in a minor track. In addition to the MS course credit requirements, nine credits of 600-level course work in the major track and three credits of 600-level course work in a minor track are required. All PhD students also must participate in a substantial teaching project and demonstrate competence in teaching.

Extended candidates for the PhD in electrical engineering must possess a bachelor’s degree in electrical engineering or its equivalent. Students are required to achieve a broad understanding of electrical engineering fundamentals and a thorough knowledge of a chosen specialty. Students must select a specific field under the guidance of a faculty adviser and present an original dissertation that contributes to electrical engineering. Findings should be publishable in refereed journals, and other scientific and engineering fora.

Prior to beginning their research, all PhD students must pass a comprehensive examination consisting of an oral exam given by the entire committee, to ascertain the student’s comprehension in the chosen specialty.

Every PhD student is required to take a qualifying examination by the end of the second semester in order to test the student’s research potential and knowledge of pertinent fundamentals. Students attain the status of doctoral candidate after passing the qualifying exam.

MS Program
This program requires 30 credits, culminating in a written and/or oral exam. Students choose to complete either a thesis or non-thesis option; those who do not possess a bachelor’s degree in electrical engineering must first fulfill a set of further requirements.