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# ELECTRICAL & COMPUTER ENGINEERING

**At UW ECE, we cultivate innovation and inspire through high-impact research. We educate and develop tomorrow's leaders to help solve the world's most pressing challenges.**

Our position as a top-ranked electrical and computer engineering department provides our faculty and student body a vibrant learning culture. Students receive a robust education through a strong technical foundation, group project work and hands-on research opportunities. Our faculty work in dynamic research areas collaborating with academia, industry and government institutions.

UW ECE continues to lead in cutting-edge science and technology while advancing socially-responsible innovation. Our innovation ecosystem is critical in promoting an entrepreneurial mindset in our teaching, and is strengthened through diverse partnerships that address complex global challenges in health, energy, technology and the environment.

## DIVERSITY

UW ECE exceeds the national average of women in the field for undergraduate and graduate degrees awarded and the number of women in tenured and tenure-track faculty positions. We continue to work to improve diversity, equity and inclusion to build a community that is welcoming, supportive and a safe place for all to learn and grow.

| Diversity of Current Students (Winter 2023) | B.S. | M.S. | Ph.D. | PMP |
|---|------|------|-------|-----|
| Women                                       | 20%  | 30%  | 23%   | 20% |
| Underrepresented Minorities*                | 14%  | 3%   | 2%    | 8%  |
| Foreign Nationals                           | 14%  | 71%  | 61%   | 50% |
| Washington Residents                        | 76%  | 17%  | 12%   | 39% |

\* Underrepresented minorities include African American, American Indian/Alaska Native, Latinx, and Hawaiian/Pacific Islander.

## DEPARTMENT HIGHLIGHTS

### #1

**STARTUP GENERATOR  
OF ALL UW DEPARTMENTS  
FOR OVER 10 YEARS**

Source: UW CoMotion, 2023

### #16

**RANKED GRADUATE ECE  
PROGRAM IN THE U.S.**

Source: U.S. News & World Report, 2023-24

### 18

**FACULTY WITH RESEARCH  
PUBLICATIONS CITED  
OVER 1,000 TIMES**

### 100%

**ADMITTED PH.D. STUDENTS  
RECEIVE 4-YEAR FUNDING**

UW ECE is the **largest department** in the College of Engineering with **1,214 students**.

**Electrical Engineering** is the most popular graduate degree major for incoming UW students.

Source: UW Office of the Registrar

# TOP-TIER EDUCATION

## UNDERGRADUATE EDUCATION

**Bachelor of Science in Electrical & Computer Engineering (BSECE) degree** prepares students for the workforce with a strong grounding in fundamentals and opportunities for internships, leadership roles, and hands-on research with renowned faculty in one of 40 department labs.

**The five-year combined B.S.-M.S. program** provides ambitious undergraduates with a seamless transition to graduate studies following completion of their bachelor's degree.

## STUDENT INNOVATION

**The ENGINEering INnovation and Entrepreneurship (ENGINE)** capstone program helps undergraduate students build and strengthen their entrepreneurial and networking skills. Students are mentored by faculty and industry sponsors while learning about innovation readiness, startups and new ventures through exciting year-long, industry-sponsored projects.



### PROJECT-BASED LEARNING: AIRCRAFT SOFTWARE CONFIGURATION TOOL

An ENGINE team partnered with Alaska Airlines on a web portal to efficiently load computer software onto airplanes. The tool will be implemented across Alaska Airlines' entire fleet.

Our graduates find employment at top companies in the region, including: Amazon • Apple • Boeing • Facebook • Google • Intel • Microsoft • T-Mobile

## GRADUATE EDUCATION

UW ECE graduate education prepares students to address pressing challenges in healthcare, energy, the environment, communication and more. Students receive unique opportunities to interact with technology companies and a vibrant startup community.

**The Ph.D. Program** prepares students for work in academia or industry as independent researchers and scholars. It is the highest degree awarded in the field. Students work closely with distinguished faculty on research and pursue their own innovative projects, preparing them to make a difference in the world.

**The Daytime Master's Program (MSEE)** provides advanced preparation for professional practice through a highly customizable, coursework-based or thesis curriculum. The coursework option is typically selected by students wanting to work at a higher level in the industry, while the thesis option involves more in-depth research and is designed for students with the passion of pursuing a Ph.D.

**The Professional Master's Program (PMP)** leads to an MSEE and offers an exciting industry-responsive curriculum. PMP students include recent undergraduates seeking more technical depth, working engineers who want to advance their career, and professionals from other backgrounds seeking to enter the field. Students explore cutting-edge technical topics and university research, giving them the expertise to drive innovation.

The Juris Doctorate and Master of Science  
in Electrical Engineering (JD/MSEE) program

The Certificate in Machine Learning and  
Deep Learning: Application Frontiers

Graduate Data Science Option (DSO)

The Certificate in GPU-Accelerated  
Computing & Visualization

## OUR STUDENTS (data from Autumn 2022)

- 700** Undergraduate students
- 232** Bachelor's degrees awarded
- 514** Graduate students
- 96** Master's degrees awarded
- 46** Professional Master's Program (PMP) degrees awarded
- 17** Ph.D. degrees awarded

## UW ECE INNOVATION

With more spinouts than any other department at the UW (20% of the University's total over the past 10 years), UW ECE faculty and students have founded or been in leadership roles at nearly 60 startup companies, including:

**A-Alpha Bio** – Accelerating drug development with synthetic biology and next-generation sequencing

**Jeeva Wireless** – Reimagining connectivity with low-power backscatter technology

**MicrobiomX** – Providing rapid, personalized restorative gut therapy through microbiota transplants

**Olis Robotics** – Making robots smarter through progressive autonomy

**OneRadio** – Changing the way we access the radio-frequency spectrum

**Parse Biosciences** – Providing scalable single cell RNA-sequencing solutions

**Proprio** – Using computer vision and machine learning to enhance human and computer performance

**Tunoptix, Inc.** – Tunable metasurface optics for machine vision and AR/VR applications

**ThruWave** – Providing state-of-the-art millimeter-wave (mmW) 3D imaging

**WiBotic** – Providing wireless power solutions for robotics

### UW ECE since FY2013:

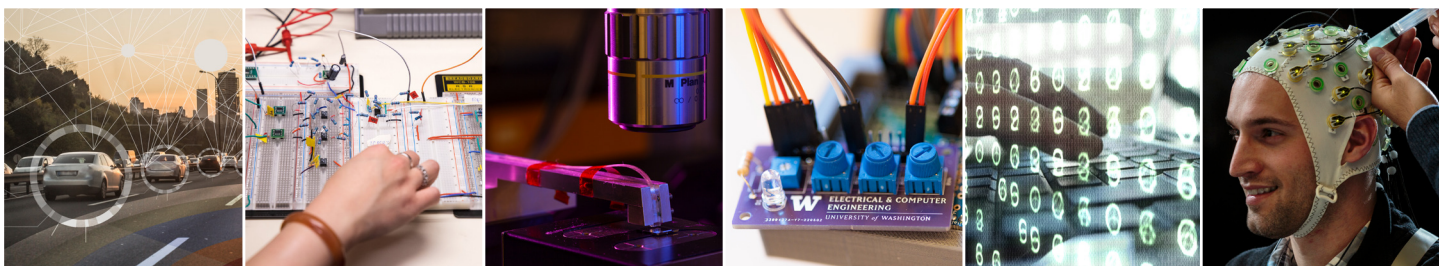
**24%**  
OF ALL UW ENGINEERING  
PATENTS

**748**  
NEW PATENTS FILED

**57**  
COMPANIES THAT HAVE  
LICENSED ECE TECHNOLOGIES

**181**  
INDIVIDUAL LICENSED  
TECHNOLOGIES





## RESEARCH

### RESEARCH AREAS



**Biosystems** – Synthetic biology, neural engineering, medical devices, mobile health



**Computing & Networking** – Computer engineering and architecture, VLSI, embedded systems, wireless communication, cybersecurity



**Data Science** – Machine learning, statistical signal processing, speech and natural language processing, computer vision and image processing



**Electronic, Photonic, and Integrated Quantum Systems (EPIQS)** – Quantum electronics, nanoscale optics, materials and structure, MEMs, novel photon sources, and optical metamaterials



**Power & Energy Systems** – Smart Grid, integration of renewable energy sources, grid security, power system economics, energy harvesting



**Robotics & Controls** – Surgical biorobotics, smart cities, haptics, network control systems

In FY22, UW ECE received \$23M  
in research awards.

### EMERGING STRATEGIC RESEARCH AREAS

**Quantum systems** promises to solve data intensive problems regular computers can't handle by increasing the capacity of quantum computing systems from its current state of 100 qubits to 1,000 qubits, with applications in cybersecurity, drug development, traffic optimization, financial modeling and weather forecasting.

**Sustainable energy systems** focus on expanding the capacity of power grids to reliably integrate renewable energy from solar and wind into existing systems. In addition to our work on smart grids, we work on grid security, energy economics, and solar and electromagnetic energy harvesting.

**Neuroengineering** explores advanced brain-computer interfaces that help the body heal itself after serious injuries and conditions such as stroke, spinal cord injury and Parkinson's disease. UW ECE partners with surgeons in UW Medicine and ethicists in the UW College of Arts & Sciences for guidance on ethical considerations in neurotechnology.

## FACULTY

Our department's reputation is based on the quality of our faculty and their contributions to education, research and leadership. UW ECE faculty are frequently honored nationally and internationally for excellence. Attracting, retaining, and rewarding faculty remains one of our highest priorities.

**47** Core Faculty

**5** Assistant Research / Teaching Faculty

**104** Affiliate Faculty

**38** Adjunct Faculty

### FACULTY ACHIEVEMENTS

**29** IEEE  
Fellows

**7** Sloan  
Fellows

**1** MacArthur  
Fellow

**5** NAE  
members

### CENTERS AND LABS

UW ECE faculty lead or participate in interdisciplinary research centers across campus, and direct laboratories at the cutting-edge of the field.

- AMP Lab – Amplifying Movement and Performance
- The UW Biofabrication Center (BIOFAB)
- Clean Energy Institute (CEI)
- Center for Neurotechnology (CNT)
- UW ECE Center on Satellite Multimedia and Connected Vehicles (CMMB Vision)
- eScience Institute
- Institute for Nano-Engineered Systems (NanoES)
- Molecular Engineering and Sciences Institute (MoES)
- Northwest Quantum Nexus (NQN)
- QuantumX Initiative
- U.S. Dept. of Energy PNW National Lab (PNNL)
- Washington Nanofabrication Facility (WNF)

# TRAILBLAZERS

UW ECE trailblazers are honored for the work they do to effect positive change in the world. Our academic pioneers' far-reaching research has created important foundations for other electrical and computer engineering scholars to build upon, while our industry leaders' ground-breaking enterprises have provided important solutions that improve lives.



**Elaine Chang (BSEE '93)** has served in various leadership positions at Amazon China, including leading the launch of Amazon Prime in China. Now managing director for AWS Greater China, she is responsible for business strategies, and industry and government partnerships.



**Alanson Sample (Ph.D. '11)** led The Walt Disney Company's work in robotics and artificial intelligence. As an associate professor at the University of Michigan, he applies novel approaches to electromagnetics, RF and analog circuits, and embedded systems.



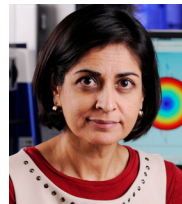
**Keith Rattie (BSEE '76)** has a 40-year-career in the oil and gas industry, serving as CEO of Questar Corp. and general manager of Chevron's international gas unit. He has helped shape utility, power and energy legislation representing industry at congressional hearings.



**Yael Hanein (Postdoc)** is an associate professor and VP of NanoRetina, a startup company developing artificial vision. Yael designs electronic nanodevices that interface with the brain, novel materials for artificial retina applications, and skin electronics for electrophysiology.



**John MacLeod (BSEE '64)** designed NASA's Apollo ground communications network, headed Skylab's solar telescope operations and held a technical management role for the Space Shuttle communications and data systems. He later founded two companies that introduced nationwide and international text messaging.



**Pamela Bhatti (MSEE '93)** is an associate professor and associate chair at Georgia Tech. She researches hearing loss through focused neural stimulation and novel implantable sensors, as well as cardiac imaging to assess and monitor cardiovascular disease.



**Gabriela A. Gonzalez (BSEE '92)** is the deputy director of the Intel Foundation, focused on K-12 STEM education for underserved communities. As a program manager at Intel Labs, she steered program and curriculum development at research universities around the world.



**Alhussein Abouzeid (MSEE '99, Ph.D. '01)** is the founding director of WiFiUS, an international NSF-funded virtual institute on wireless systems research. He builds dynamic wireless networks with applications in environmental sensing and disaster response.

"Electrical and computer engineering technology has become ubiquitous, defining how we work, how we live, and even what it means to be human. UW ECE means more than just exploring amazing new technologies; it means shaping the future of humanity."

— UW ECE Professor and Chair Eric Klavins



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ENGINEERING**

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