

COMMUNICATIONS

OVERVIEW

Students in the Communications concentration will develop a fundamental understanding of how digital communications (internet, optical fiber communications, cable/DSL, magnetic recording, storage on flash memory) and wireless communications (Wi-Fi, Bluetooth, Zigbee, LoRa, cellular, underwater and satellite networks, IoT, digital TV and radio) work. You will study design principles of modern communication networks, network security, and the theory and practice of how electronic devices communicate. This concentration will help you design, build, and test different types of networks, and optimize their performance, reliability, security, and energy efficiency. What you learn here can be nicely coupled with embedded computing, signal processing, and control courses to form a deeper understanding of the role of communications within larger cyber-physical systems in everyday societal use.

AREAS OF IMPACT

- Air & Space
- Computing Data and Digital Technologies
- Environment Sustainability and Energy
- Health and Medicine
- Infrastructure Transportation and Society
- Robotics and Manufacturing

STUDENTS MIGHT BE INTERESTED IN THIS CONCENTRATION IF THEY ENJOY:

Math, physics, software programming (Python), MATLAB, hardware experimentation, digital signal processing.



WHAT KIND OF PROJECTS DO STUDENTS COMPLETE IN THEIR CAPSTONE?

Some examples are below. In addition to these, students complete a variety of industry-sponsored projects in this concentration as well: space communication systems for CubeSats, decoding HD radio and ATSC HDTV, fingerprinting electronic devices via their RF emissions, building radio telescopes, decoding satellite signals/NOAA weather maps, building a satellite ground station tracker and monitor, eavesdropping on computer screens via unintentionally radiated RF, tracking aircraft in real-time via decoding their ADS-B signals, building FM, AM, SSB, and SSTV transmitters, building a GSM/LTE network base station, and building a drone detector and jammer.

WHAT KIND OF INTERNSHIPS DO STUDENTS PURSUE?

Students typically find well-paying internships at companies ranging from the Fortune 500 to local and Silicon Valley startups working on hardware and software systems that require development or use of communication networks and protocols.

WHAT CLASSES OUTSIDE OF ECE WILL HELP STUDENTS LEARN RELATED AND USEFUL SKILLS?

Classes in applied mathematics/statistics that cover topics such as probability and statistics, mathematical analysis, linear algebra and scientific computing. Also courses that build strong programming skills (in C and Python) and computing utilities (OS, software packages).

WHAT RESEARCH OPPORTUNITIES ARE AVAILABLE TO UNDERGRADUATES IN THIS CONCENTRATION?

Faculty in the communication group work on an exciting array of research projects covering areas such as 4G and emerging 5G technologies, multi-standard wireless inter-networking and radio spectrum coexistence using cognitive radio platforms, terrestrial vehicular, aerial and underwater networks, wireless and sensor network security, adversarial modeling, privacy and anonymity in public wireless networks, cyber-physical systems security, millimeter-wave sensing and imaging, RFID, energy efficiency at the physical layer of wireless communication, physics of sensing and actuation, information theory and its applications in communication networks, machine learning and blockchain systems, software defined radio and networks, and wireless sensors networks for commercial, environmental, health and medical, and industrial applications.

WHAT KINDS OF JOBS DO STUDENTS GET AFTER GRADUATING?

- Amazon (Project Kuiper) and SpaceX: LEO satellites for global access
- T-Mobile/AT&T/Verizon: 5G and IoT networks and services
- Qualcomm, Intel, Broadcom, Samsung, Texas Instruments, Analog Devices, Apple: Communication ASICs and hardware
- Cisco, Juniper, Alcatel-Lucent, Huawei, Aruba, Akamai, F5 Networks, Nokia: Network infrastructure
- Google, Facebook, Microsoft: Software for Network Infrastructure
- Boeing, Lockheed Martin, Northrop Grumman, Raytheon: Federal Govt. and contractors
- NASA, Nokia Bell Labs: Advanced Development
- Ford, GM, Toyota, Tesla, Denso, Paccar: Autonomous Vehicles
- Many other companies in photonics, oil, and gas
- Many startups (from UW ECE: WiBotic, ThruWave, Jeeva, OneRadio)

DO STUDENTS NEED A GRADUATE DEGREE SPECIALIZING IN THIS AREA TO BE MARKETABLE IN INDUSTRY?

No. Although a graduate degree is always an option, students can easily get a good job with only a bachelor's degree.



QUESTIONS? Contact us at: undergrad@ece.uw.edu or attend a prospective drop in session: bit.ly/eceadvising