Welcome!

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Overview

- What is ECE anyway?
- ECE at WPI
- Careers for ECE graduates
- Student Q&A
What is ECE?

Health Care
Sustainability
Safety / Security

Solving Important Problems
Being Creative
Making a Difference
What is ECE?

Health Care
Sustainability
Safety / Security

Solving Important Problems
Being Creative
Making a Difference

WPI: Challenge + Support
Health Care

- Diagnostic Sensing / Imaging
- Assistive Technologies
- Neurally Controlled Prosthetics
- Clean Air, Water
Sustainable Energy

- Energy Storage
- Optimizing Solar Panel Energy Collection
- Smart Grid Security

Holy Name High School Wind Turbine that resulted from an ECE Undergraduate Project
Safety and Security

• Technology for first responders
• Data security
• Securing communication
• Smart grid security
• 24 full-time faculty
• 350 undergraduates, 140 full-time grad students
• ~ 80 BSECE, 60 MS, 4 PhD annually
• Innovative, project-based undergraduate program with a focus on creativity and teamwork
• Student project & research activity with corporations, National Science Foundation, Lincoln Labs, etc.
• Active graduate research program that integrates undergrads into many of the projects
Focus Areas within ECE

- Computers/Microprocessor systems
- Microelectronic Circuits
- Electromagnetics, Antennas
- Satellite and Indoor Positioning Systems
- Power Electronics and Systems
- Data Security, Cryptography
- Communications, Wireless Networking
- Software Defined Radio (SDR)
- Biomedical Signal Processing, Advanced Prosthetics
- Robotic Systems and Sensors
In ECE what is the first year like?

- Math, science, CS intro courses
- Humanities and arts
- ECE courses for first year students!
  - ECE 1799
  - ECE 2010
- INSIGHT first year advising program
- Get involved - play sports, join a theater group, work with a service organization, . . .
Two ways to get started
- You can start in any term: A, B, C, or D!

ECE1799: Frontiers and Current Issues of ECE
- Seminar based course for First Year students
  Survey breadth of activities, career choices, technologies across ECE.
- Primarily for students who have not decided on a major or who are unsure of an ECE major.

ECE 2010: Introduction to ECE - An Application Oriented Approach
- Laboratory-based introduction to the broad subject of ECE.
- Analyze, construct, test: iPod amplifier, RF transmitter, sensor systems ...
- Moderate depth treatment of a wide variety of fundamental topics.
- Typically followed immediately by ECE2019, ECE 2029 or ECE2049: Sensors & Circuits, Digital Circuit Design, Embedded Computing
Second year in ECE

ECE major area foundation courses
- $\approx 60\%$ courses laboratory based
- We believe in “hands-on” experience as essential to learning in our courses!

ECE 2799 – Ideas in Action
- Projects based foundation integration course and MQP prep
- Work in teams to design a solution to an open ended problem using all your background
- Named by Seniors and alums as the single best and most important course they took in any department at WPI!!!!

Design that Matters: “Always Ready” Solar Charged LED Lantern
What is the third year like?

- Opportunity to participate in a Global Program project (over 600 WPI students / year)
- Continue taking major, minor and/or dual-major courses
- Focus on an area within ECE, develop background needed for the capstone (MQP) project
- Plan for fourth year capstone project experience
- Plan seriously for graduate school, other post graduation education/work
Fourth year in ECE at WPI

- Complete capstone project – Intensive project with real results, the WPI MQP
- Advanced major area courses and complete minors/dual majors
- GRADUATE and then: Get a job, start a company, graduate school, medical school, law school, MBA, …
Example MQP Projects

Business
At WPI, a push to make smart wheelchairs
MQP project: Rescue Quadcopter

- Can fit through 22” x 6” opening
- Automatic collision avoidance
- Sensors: IR rangefinder, LIDAR and video camera
- Autonomous stable flight
- 1 kg payload capacity

- Semi-autonomous search and rescue quad-copter
- Indoor reconnaissance for first responders
MQP Projects – ECE Project Centers

Many ECE MQPs in collaboration with off-campus project sponsors:

- **Lincoln Labs Project Center**
  - Lexington MA

- **MITRE Corp. Project Center,**
  - Bedford MA

- **Silicon Valley Project Center,**
  - SRI, NVIDIA, Silicon Valley, CA

- **General Dynamics Project Center,**
  - Groton CT

- **Wall Street/London Project Center,**
  - New York, NY

- **China Project Centers**
Faculty Research Areas

- Cryptography and Information Security (CRIS) Laboratory
- Analog and Mixed Signal Microelectronics Laboratory
- Signal Processing and Information Networking Laboratory (SPIN)
- Embedded Computing Laboratory
- RF-Electronics and Medical Imaging Laboratory
- Cyber Security Laboratory
- Center for Advanced, Integrated, Radio Navigation (CAIRN)
- Antenna Laboratory
- Wireless Innovation Laboratory (WI Lab)
- Laboratory for Sensory and Physiologic Signal Processing L(SP)2
- Center for First Responder Technology / Precision Personnel Location

Many MQPs are based on these areas of faculty research and done in these research labs
Review: Why study ECE at WPI?

Year 1: Intro ECE: Theory and Practice (hands-on labs)
Year 2: ECE Design: Team Design Project
Year 3: Go Global: London, Venice, Bangkok, Melbourne, Washington, Cape Town, Hong Kong…
Year 4: Senior Design Project: Lincoln Labs, Silicon Valley, …
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State of the Art, Student Centered

- Modern, well equipped and well maintained laboratories.
- Projects and laboratory experiences that are “real” and make a difference.
- A strong advising system.
- Focus on teamwork.
- Friendly, supportive community.
- Open 24/7 for student use.
Very active student organizations:
- IEEE Student Chapter
- HKN Honor Society
- WECE (Women in ECE)
- Pizza Fridays
- IEEE Barbecues
- Senior Dinner
- The Spark Party
Goals for WPI Students

**Become an “Expert”**
- Master the discipline
- Get the answers right

**Solve Real Problems**
- Very un-disciplined
- Ask the right questions

**About Courses… and the Discipline**

**About Persistence… and Experience**

Worcester Polytechnic Institute
Goals for WPI Faculty

Challenge

Provide structure
Demonstrate knowledge

Support

Unstructured problems
Mentor through process

About Courses…
and the Discipline

About Relationship …
and Experience
In ECE at WPI you will be ...

 Welcomed

 Valued

 Challenged

 Supported
Thanks for visiting today

Feel free to contact me:
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Computer Engineering or Computer Science??

- Hardware + Software vs. Software
- Engineering vs. Science

- Computer scientists discover underlying principles of computation: logic, language, knowledge organization...
- Computer engineers use these principles to solve problems in hardware and software involving an enormous number of applications, products and devices using embedded processors and DSPs.
Some more senior projects

- Develop a system that integrates wireless networking and RFID technology so that every store item (quantity, type, price) can be automatically inventoried.

- Develop microcomputer controlled sun tracker for increased efficiency solar energy collector

- Develop a multi-camera vision based robot tracker that will provide location information for all robots on a FIRST Competition field for use during autonomous scoring periods.

- Develop a high efficiency solar power converter for use on a nanosat.

- Develop an autonomous fire-finding and extinguishing robot.