Why Study Electrical or Computer Engineering?

Fall 2015
Why Study Engineering?

- Look around:

  Everything you see and experience in daily life has been built and designed to work.

  Somebody *needs* to do this work.

  That somebody could be you.
Why Study Engineering?

Because (to borrow from Hobbes) our lives would be poor, miserable, pathetic, short, brutish, undemocratic, and sad without the contributions that engineers have made to the world.
But why study ECE?

- Other engineering fields contribute to the basic “quality of life” infrastructure --- roads, bridges, etc.

- Electrical and computer engineering bring modernity to these classical structures.

- Because it is cool, fun, interesting, challenging, and in high demand.
Before and After…

The following slides offer a view of life before modern engineering (and in particular, electrical or computer engineering), and after engineering stepped in.
A modern vehicle may have dozens of microprocessors (computers), and hundreds of sensors.
Modern transportation systems use sensors and communications ubiquitously.
Water delivery and treatment systems rely heavily on sensors, controls, and communications.
Housing automation increasingly uses sensor and computation systems for comfort and efficiency
Medical imaging system use acoustics, electromagnetics, signal processing, and a lot of computation to do their job of saving lives.
Prosthetics are increasingly robotic. Current prosthetic research aims to connect neural impulses to provide hand and gait motion --- sensors, signal processing, controls.
Everything on the web owes its existence to computer engineers and electrical engineers: routers, switches, computers, cloud storage, routing algorithms, etc., etc.
Every modern appliance has its own computer, and its own sensors.
All the communications we have enjoyed for decades come from electrical and computer engineers: electromagnetics, digital design, signal processing, switching, antennas, ...
Computers obviously fall in the realm of ECEs. So do programming: industry tells us that they love to have our engineers as coders --- great problem solvers with solid technical skills.
Would you get in an airplane if the avionics wasn’t working?
Image processing; communications; error correction coding; electromagnetics, SOC, embedded systems, etc.
Radio, TV, records, stereo, tape, iPod: every entertainment technology, every technical area.
Manufacturing generally relies on electrical systems for automation, sensing, control, information systems, etc.
Mining makes increasing use of automated system: efficiency, safety, and profit.
Environmental monitoring, weather prediction: uses sensors and massive computational systems
Time keeping has driven technology, and been driven by technology. Embedded systems, communications, sensors, algorithms...
Memory systems fall squarely in the realm of ECE (a large employer of our students)
Would you get in a rocket without working avionics?
Electric vehicles and other alternative fuel systems make extensive use of ECE.
Satellites, navigation, handheld capability!
Electrical and Computer Engineering provide the brains behind all the robotic systems now and forthcoming.
The entertainment industry employs many EEs and CompEs – special effects, animation, etc.
Why Study ECE?

- To be a member of an excited, motivated professional team working to find solutions to real, hard problems.
- To Dare Mighty Things --- to overcome difficult challenges through work and intellect.
- Because not everything has been invented!
- To create new things.
- Because you can be part of the solutions the world needs.
What Do Engineers Do?

◉ Create
◉ Sell/support/market
◉ Discover
◉ Code
◉ Advise
◉ Consult

◉ Lead
◉ Manage
◉ Field studies
◉ Collaborate
◉ Test
◉ Standardize

It can be something new every day!
(There is a lot to do. We need a lot of help.)
Kinds of Engineering

- Electrical engineering (TV, phone, radio, communication, radar, transportation, etc.)

- Computer engineering (computers; tablets, storage; networking, system architectures, etc.)
Employment Prospects

- Excellent.
- Engineers are among the highest paid graduates with BS degrees.
- Flexibility:
  - Engineers go on to head companies (more CEOs than any other major)
  - Law
  - Medicine
- “Liberal education” for the 21st century
High School Preparation

- English
- Math (get through calculus in HS if you can)
- Physics (with calculus)
- Chemistry
- Biology
- Programming
What You Study at USU

- Prep: Calculus, Physics, Programming
- Analog circuits, digital circuits, more math
- Signals, electronics, microprocessors
- CE: algorithms, networking, architecture
- EE: electromagnetics, signal processing
- Senior Project
- Technical electives: satellite design, communications, controls, VLSI, signal processing, antennas, embedded systems, etc., etc.
Build something!

The sky is the limit: robots, helicopters, music composition, communications, home automation, 3D display, assistive technology, car and motorcycle technology, guitar and audio effects.
Join us!

(Unlike other programs, no enrollment cap --- if you meet the qualifications, you can join the program.)