Introduction and Overview
Spring 2019

What is ECE120?
- Teach a systems perspective that includes both hardware and software (and math!)
- ECE culture and goals
- Expectations of engineers
- Lifelong learning necessary
- Understand and identify tradeoffs
- International group—leverage it!
- Academic reality and grade philosophy

Why Start with Computers?
Why study computers first?
Do Aeronautical Engineers start with the high-bypass turbofan engine?
Or do they start with basic dynamics and lift?
Why not build up to computers slowly?
Computers are Universal Computation Devices

Described by Alan Turing in 1936

Church-Turing Hypothesis: Computers and humans can compute the same things.

More Neurons than Transistors?

"The apparatus they [animals] use for timing their movements has more in common with an electronic computer, although it is strictly different in fundamental operation. The basic unit of biological computers, the nerve cell or neurone, is really nothing like a transistor in its internal workings. Certainly the code in which neurones communicate with each other seems to be a little bit like the pulse codes of digital computers, but the individual neurone is a much more sophisticated data-processing unit than the transistor. Instead of just three connections with other components, a single neurone may have tens of thousands. The neurone is slower than the transistor, but it has gone much further in the direction of miniaturization, a trend which has dominated the electronics industry over the past two decades. This is brought home by the fact that there are some ten thousand million neurones in a human brain: you could pack only a few hundred transistors into a skull.


Today: Billions of Transistors

Dawkins was writing in 1976.
Moore’s Law continued.
1997: Pentium released, 4.5 million transistors
Today: 21.1 billion transistors on 815mm²
(NVIDIA GV100 GPU – https://devblogs.nvidia.com/inside-volta/)
Smaller than neurones!
... still only 3 terminals

ECE Has Undergone a Digital Convergence

Many alumni, including EEs, in the industry are now computer people.
Most solutions are digital.
Digital system design provides a critical set of skills needed by nearly every ECE grad.
These skills will enable you to go further faster...
Bottom Up Approach Provides a Firm Understanding

Why do we build from the ground up?
◦ Helps you develop a solid understanding of the design and operation of each level.
◦ Easier to make effective use of abstractions and to improve those abstractions.
◦ Our students have been successful based on this approach (alumni feedback).

Where to Find Information

Start with the class web page!
One way: remember this link
lumetta.web.engr.illinois.edu/120-S19/

Another way:
◦ type “Steve Lumetta” into Google
◦ Follow link to 120 S19 page under “Classes”

Read the Web Page and WeChat Every Day

lumetta.web.engr.illinois.edu/120-S19/
What you will find includes:
◦ announcements from course staff
◦ course information and timing
◦ assignments, solutions, exams, and due dates
◦ a place for exchanging information
◦ ask any non-personal questions here
◦ do not post answers

What to Read (and What Not to Read)

Reading materials
◦ Patt & Patel, 2nd edition
◦ ~150 pages of notes (free online)
◦ learning objectives summarized in notes
Read the notes (see schedule on web page for which parts)
◦ before class
◦ AND after class
Look at learning objectives in notes summary sections.
Use the online tools to practice skills.
Be wary of the Web. No one has screened the content for accuracy.
Workload Includes Labs and Homework

Lab assignments roughly every other week
- Software and hardware
- Usually due Mondays
- See assignment for specifics of how and when to turn in

**FIRST LAB: TBD**

Weekly homework assignments
- Paper and computer-based
- Due at START of section on Fridays

**FIRST HOMEWORK: FRIDAY 1 MARCH**

Workload Also Includes Exams

Three midterms
- Thursday 14 March, 7:00-9:00 p.m.
- Tuesday 16 April, 7:00-9:00 p.m.
- Tuesday 7 May, 7:00-9:00 p.m.

Final exam
- Watch web page for details.
  - *My apologies for not reviewing this date earlier!*

And Workload Includes Discussions

A question for you:
What skill least developed in many ECE grads?
The answer that many alumni and employers give: **soft skills**!
In discussion section every Thursday, you will...
- work in small groups
- solve fun problems related to lecture together
- practice working with others

How Will We Grade?

- Labs 15%
- Homework 15%
- Discussions 5%
- Midterms 10%, 15%, 15%
- Final 25%

*No late homework accepted.*
Late labs penalized 2% per hour or fraction thereof.
ECE120 Grading Scales Posted Later

Many of your classes here will be curved.
We will have...
◦ an absolute scale and
◦ a curve.
Each person will get the better of the two grades.

Grading scales will be posted mid-semester.

Be Sure to Do the Labs!

Labs are important. ECE is a hands-on department, and you will learn by doing.

If you score < 50% on the lab component, you will receive an F for the class.
Please don't do that.

Please Go on Time to Discussion!

In discussion, you will work in groups.

So we need you to arrive on time.

If you come late, you delay and disrupt your group...
... so you will lose points.

(Swap your discussion section and/or let your TA know if you have to walk a long distance.)

Get to Know Your Fellow Students

Say “hi” to the person next to you
◦ in lecture,
◦ discussion,
◦ the gym,
◦ the movie theater.

Go ahead, try it now. Really!
Don’t Cheat!

See Section 1-402 of the Academic code.

Discussion sections are done in groups.
In some labs you will have partners.
Otherwise, work must be your own.
It’s ok to talk and help each other understand,
but it’s not ok to give/share/lend/copy/allow
someone to copy answers.

Your Guide to the Slides

The title gives the main point.
Definitions and key messages in bold blue.
Parameters and variables in bold green.
Other colors used on a per-slide basis.