University of Illinois at Urbana-Champaign
Dept. of Electrical and Computer Engineering

ECE 101: Exploring Digital Information Technologies for Non-Engineers

Fall 2024

Lecture 1: Introduction and Landscape

The World Has Undergone a Digital Convergence

- **Many alumni** across many disciplines
  ◦ inside and outside of engineering
  ◦ **are now computer people**.
- Most solutions are digital technology.
- Understanding the basics and implications provides **a critical set of skills**.
- These skills will enable you
  ◦ to **go further faster**, and
  ◦ to **make sound decisions** as a voter.

What is our Class About?

Two key concepts lie at the core of technology
  ◦ **information**: data, statistics, or knowledge about something or someone
  ◦ **computation**: the act of mathematical computation ...
        ... according to one dicti

What is technology?

Listen to YouTube cofounder
Steve Chen today at 4:00PM

Use of computation and dist
        to improve people's

What Does the Class Cover?

An **under-the-hood view of important technologies** that will impact your daily life in the next decade.

For each technology, **we will explain**
  ◦ the core technical **challenges**,
  ◦ the **solutions** to these challenges,
  ◦ How the technology translates to **business and revenue**, and
  ◦ What the technology implies in areas such as **privacy, fairness, policy, ethics**, and other paradigm shifts.

What are We Hoping that You will Learn?

Give you **insight as to** who does what, how it all fits together, and what **the future** might hold.

But also to give you a basis for **computational thinking:** what is possible?

Help you as a citizen in a democracy **to make the best choices** about what is allowable.
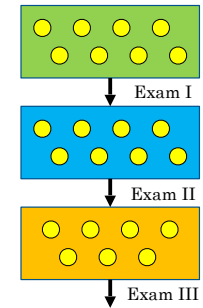
What's the Overall Structure?

Weekly structure: two lectures and a lab

Format of class
- **Three parts**: past & present, intelligence, and future technologies.
- Each part **about three to five weeks**.
- Within each part, **roughly seven or eight topics**.
- After **each part**, **an exam** on that part.
 (**no final** exam)

Exam I

Exam II

Exam III

First Part of the Course Covers Past and Present

Let's look a bit more closely at the topics!

Part I: Past & Present—Connecting the World
- Week 1: Landscape, History, & Terminology
- Week 2: Communication: WiFi
- Week 3: Communication: Cellular and How the Internet Works
- Week 4: Web services and distributed systems
- Week 5: Social networks and storage
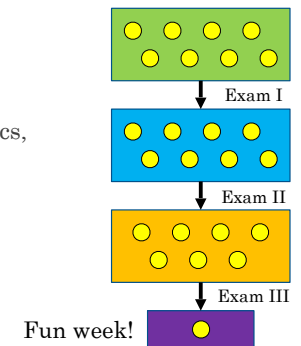- Week 6: Part I exam

Exam I

Exam II

Exam III

Fun week!
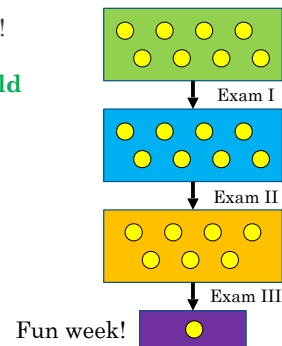
Second Part of the Course Covers Intelligence

Part II: Intelligence & Implications
- Week 7: web search and recommendations
- Week 8: machine learning and AI
- Week 9: Physical security, authentication, ethics, privacy, and Fairness
- Week 10: Exam 2

Exam I

Exam II

Exam III

Fun week!

Third Part of the Course Covers the Future

Part III: Future
° Week 11: sense-compute-communicate, voice assistants, and wearables
° Week 12: automated speech, language, and vision
° Week 13: AR/VR and automated driving
° Week 14: Fall Break
° Week 15: Working with Data
° Week 16: Exam 3

Exam I

Exam II

Exam III

Fun week!
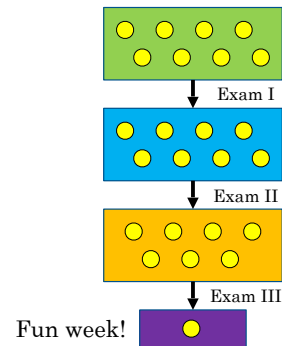
What Happens at Our Meetings?

In each lecture:
° What's **the problem** being solved?
° Where's **the computation**?
° What are **the key technologies and companies**?
° What are the **benefits, pitfalls, and issues**?

In the labs, **we'll use Wolfram Notebooks** and try out some ideas and solutions using technology.

Course Logistics

Course website: go.ece.illinois.edu/ece101

Administrivia

Course web page:
° all kinds of info,
° slides, and
° links to everything below…

Canvas
• Discussions for Q/A—make sure you have notifications set up to not miss any announcements.
• Grades

Gradescope.
• Lab submissions

How Does the Grading Work?

- Participation … 20%
  (6 absences allowed)

- Weekly labs … 35%
  (lowest 2 dropped)

- Three exams … 45% (15% each)
  Regrade policy: Correct mistakes and turn in for half of the points lost

Summary of Exam Dates

Exams are all in-class, so please let us know (ASAP) if you need other accommodations.

Exam date summary:
- Exam on Part I: **Wednesday, Oct 2nd**
- Exam on Part II: **Wednesday, Oct 30th**
- Exam on Part III: **Wednesday, Dec 11th**

(NO FINAL EXAM)

Who are We?

Course Directors

Romit Roy Choudhury
Prof. ECE, CS, CSL
At UIUC since 2013
(MS, PhD from UIUC)

Research: Wireless networking, Signal processing, Sensing, Internet of Things

Education: Networking & mobile computing

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Steve Lumetta
Assoc. Prof. ECE, CS, CSL
At UIUC since 1998
(BS, MS, PhD Berkeley)

Research: Networks, Processors, Accelerators, High-Performance Computing, Genomics

Education: 3×CE core courses & many others

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http://lumetta.web.engr.illinois.edu/

Who are We?

Instructor

Abrita Chakravarty
Instructor, ECE, UIUC
Wolfram U, Wolfram Research since 2013
(MS from Duke University)

Current Interests: Instruction Design, Data Science

Graduate Research: Computational Genomics

Education: Electronics Engineering; Computer Science

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https://www.wolfram.com/wolfram-u/instructors/chakravarty.html

Who are We?

Teaching Assistant

Sattwik Basu
Graduate Student
sattwik2@illinois.edu
261 Coordinated Science Lab

Graduate Advisor
- Romit Roy Choudhury (PHD)

Research Areas
- Audio, speech, music and auditory processing

And ECE …

We in the Illinois ECE community are committed to understanding, empathizing with, and respecting each other, embracing the many differences among us.