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

ECE 101: Exploring Digital Information Technologies for Non-Engineers

Fall 2023

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 dictionary

What is technology?

Use of computation and distribution of information to improve people's lives.

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?

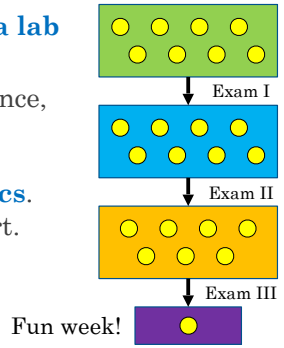
Help you as a citizen in a democracy **to make the best choices** about what is allowable.

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 five weeks**.
- Within each part, **roughly eight topics**.
- After **each part**, **an exam** on that part.

(**no final** exam)



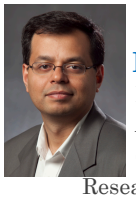
What Happens at Our Meetings?

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 play with the ideas and solutions.

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
croy@illinois.edu
http://croy.web.engr.illinois.edu/

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

Who are We?

Instructor

Abrita Chakravarty

Instructor, Wolfram U

At Wolfram Research since 2013

(MS from Duke University)

Current Interests: Instruction Design, Data Science

Graduate Research: Computational Genomics

Education: Electronics Engineering; Computer Science

abritac@wolfram.com

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

How Does the Grading Work?

- Participation … 10%
  (6 absences allowed)
- Weekly labs … 45%
  (lowest 2 dropped)
- Three exams … 45% (15% each)
  Regrade policy: Correct mistakes and turn in for half of the points lost

Administrivia

Where to find information?

https://courses.grainger.illinois.edu/ece101/fa2023/

Will take you to the class web page with…
- all kinds of info,
- slides, and
- links to everything below…

Slack for Q/A—invitation sent to email after class.

Grade data will be kept in Canvas.

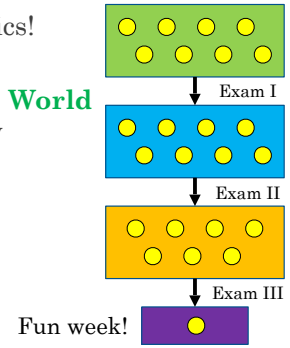
Video recordings will be available on the website.

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

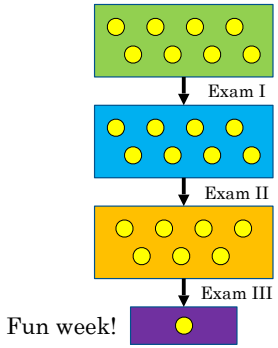
- Week 1: landscape, history, & terminology
- Week 2: communication: WiFi and Cell
- Week 3: how the Internet works
- Week 4: web services and social networks
- Week 5: distributed systems and storage
- Week 6: Part I exam



Second Part of the Course Covers Intelligence

Part II: Intelligence & Implications

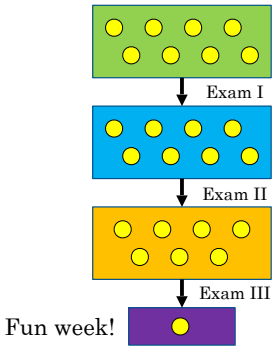
- Week 7: web search
- Week 8: recommendations and gaming
- Week 9: machine learning and AI
- Week 10: ethics, privacy, and security & Exam 2



Third Part of the Course Covers the Future

Part III: Future

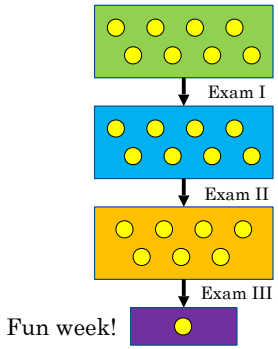
- Week 11: sense-compute-communicate, voice assistants, and wearables
- Week 12: automated speech, language, and vision
- Week 13: AR/VR and automated driving
- Week 14: Working with Data and Exam 3



Last Week Just for Fun!

Wrap-up

- Week 15: fun week



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 27 September**
- Exam on Part II: **Wednesday 27 October**
- Exam on Part III: **Wednesday 1 December**

(no final exam)