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

ECE 101: Exploring Digital Information Technologies for Non-Engineers

Spring 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 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)

Exam I

Exam II

Exam III

Fun week!
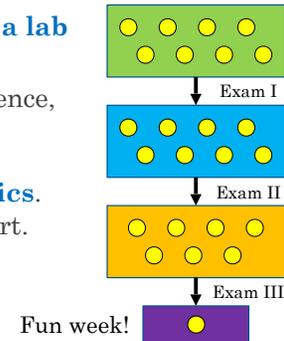
What Happens at Our Meetings?

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 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

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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

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 … 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

Administrivia

Where to find information?
 https://courses.grainger.illinois.edu/ece101/sp2024/

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.

Lab submissions accepted through Gradescope.

Grade data will released on Canvas.

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

Exam I

Exam II

Exam III

Fun week!
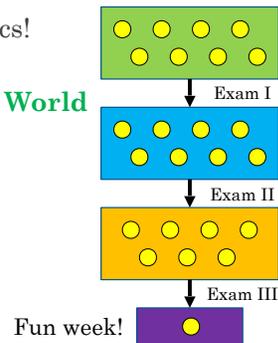
Second Part of the Course Covers Intelligence

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

Exam I

Exam II

Exam III

Fun week!
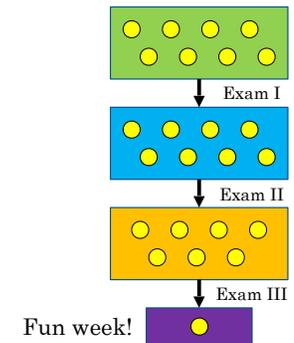
Third Part of the Course Covers the Future

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: Working with Data and Exam 3

Exam I

Exam II

Exam III

Fun week!
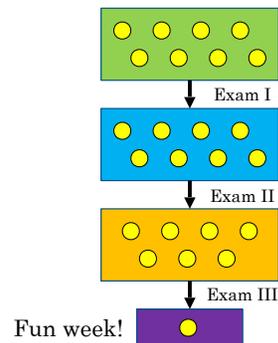
Summary of Exam Dates

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

Exam date summary:
- Exam on Part I: **Monday 19 Feb**
- Exam on Part II: **Fri 29 Mar**
- Exam on Part III: **Wed 1 May 1**
                      (no final exam)