

COS 109 basic info

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office hours: right after class or make an appointment

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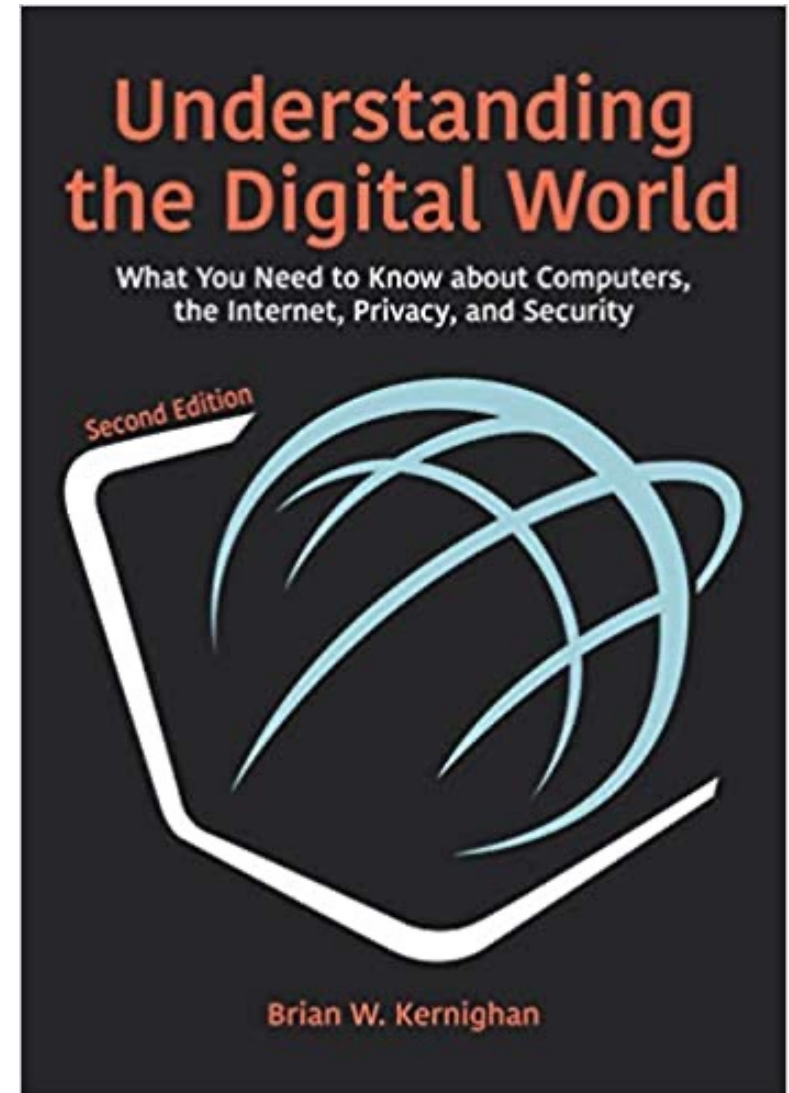
- **web site: www.cs.princeton.edu/courses/archive/fall24/cos109**
(we won't use Canvas much)
- **please fill out the survey (link is also on web site)**
<https://forms.gle/cZYdW7xSdPMi3RfP6>
- **first problem set due midnight Wednesday Sept 11**
- **first lab due midnight Sunday Sept 15**
(both are posted on the course web page)

Administrivia (check the web page for updates)

- **notes will be posted online (also 1-page handout)**
 - but not everything will be in them or in the textbook
- **readings: ~ 1 hour/week, before class**
 - textbook readings are important; others are for cultural enrichment
- **8 problem sets: ~ 1-2 hours each**
 - posted by Wednesday, due following Wednesday by midnight
- **8 labs: ~ 2-3 hours each**
 - posted by Sunday, due following Sunday by midnight
 - labs and problem sets all done by Thanksgiving
- **open-book take-home midterm during midterm week**
- **open-book take-home final exam during December exam period**
- **grading (*approximately*):**
 - 20% problem sets + 20% labs + 20% midterm + 35% final + 5% participation
- **regular attendance at lectures is required; participation helps**

Textbook

- **2nd edition is definitely preferable**
 - **get the paperback version!**



House rules

- **Covid, flu, RSV, Princeton Plague, ...**
 - **please be vaccinated, boosted, socially distanced**
 - **stay home if you're sick!**
- **turn off your phone and laptop**
 - **it helps to keep you and me and your neighbors engaged**
- **ask questions / make comments / ... about anything any time**
- **let me know if there's anything I can do to make this work better**
- **questions so far?**

COS 109 policy for ChatGPT, etc.

For now:

- You *may not* use ChatGPT or similar generative AI programs for problem sets.
- You may use ChatGPT *et al* for labs for finding out how to use languages and tools, but not for generating significant parts of a lab (unless it's an explicit part of the instructions). If you do use ChaptGPT or the like, you must say so and describe how you used it.
- You may use ChatGPT *et al* for helping you to understand course material better, e.g., "explain binary numbers to me, one more time."
- You can't use a computer at all for midterm and final exams.

We'll revisit this as we go along. Discussion is very welcome.

Things to notice

- **pervasive computer systems; we depend on them completely**
- **complicated mixture of legal, political, economic, social issues**
- **running themes:**
 - privacy & security**
 - money & property**
 - rights: individual, government, corporations**
 - jurisdiction: who gets to decide**
- **things are changing rapidly:**
 - **Google (Alphabet) is 26: founded in 1998**
 - **Facebook (Meta) is 20: 2004**
 - **Twitter (X) is 18: 2006**
 - **iPhone is 17: 2007**
 - **Instagram is 14: 2010**
 - **Zoom is 13: 2011**
 - **TikTok is 8: 2016**
 - **ChatGPT is less than two! Nov 30, 2022**

Course outline

- **hardware (3-4 weeks)**
 - how computers represent and process information
 - what's inside a computer, how it works, how it's built
- **software (3-4 weeks)**
 - how we tell computers how to do things
 - a very gentle introduction to programming in Python
- **communications + data (3-4 weeks)**
 - how the Internet and the Web work
 - artificial intelligence, machine learning, natural language processing
 - threats and defenses: privacy, security, cryptography
- **along the way, lots of current events, history, QCR, ...**

Hardware: tangible devices and gadgets

- **how computers represent and process information**
 - universal digital representation of information:
everything is represented as numbers
 - bits, bytes, binary
- **a computer is a universal digital processor**
 - it stores data and instructions in the same memory
 - the instructions are numbers
 - it's a general purpose machine:
change the numbers and it does something different
 - your phone is a computer
- **hardware has been getting exponentially smaller, cheaper, faster for over 60 years**

Software: telling computers what to do

- **algorithms**
 - precise sequences of steps to perform various tasks
 - what's possible, what's feasible, what's efficient
 - some problems are intrinsically very hard (we think)
- **programs and programming**
 - implementation of algorithms to be run on a computer
 - programming languages: how to express the steps
 - real programs: operating systems and applications
- **software intellectual property issues**
 - patents, copyrights, standards, ...

Communications: computers talking to each other

- **the Internet is a universal digital network**
 - depends on protocols, standards, agreements, cooperation
- **we can easily communicate with people anywhere**
 - we are visible to and accessible by strangers everywhere
- **information passes through many sites**
 - where it can be inspected, copied, modified, blocked, slowed down, ...
- **personal privacy and security are at risk**
 - tracking, data aggregation, surveillance (government and commercial)
 - phishing, identity theft, ...
 - viruses, bots, hijacking, trolls, disinformation, ...
- **everything on the Internet is vulnerable**

It's not just computers

- **computers & networking are embedded in many devices**
- **devices are increasingly powerful**
- **devices and systems are often connected to the Internet: the "Internet of Things"**

phones

games, toys, consumer electronics and appliances:

Alexa et al, smart TVs, Fitbit, Ring, Nest, ...

cars (self-driving or not)

planes

medical systems and devices

infrastructure: phones, power, transportation, manufacturing, ...

weapons

...

Goals of the course

- **understanding how digital systems work**
 - hardware, software, communications
 - representation, processing, storage, transmission of information
 - principles, not just today's details and buzzwords
 - some useful skills
- **some sense of the past and possible futures**
 - history, trends, potential, intrinsic limitations, tradeoffs
- **some appreciation of computer science as a discipline**
 - great ideas, algorithms, capabilities and limits of computers
 - and its usefulness in other academic fields
- **useful QCR**
 - numeracy: reasoning, estimation, assessing numbers, ...
 - judgement: do the numbers make sense? are they plausible?
 - enough programming that it's not a mystery
- **intelligent skepticism about technology**