COMPUTER SCIENCE 126

Spring 2025

https://www.princeton.edu/~cos126

PRINCETON UNIVERSITY

Senior Staff

Kobi Kaplan

Donna Gabai

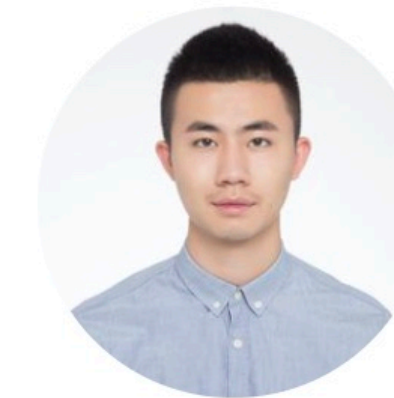Alan Kaplan

Adam Finkelstein

Assistant Instructors

Tanvi Namjoshi

Ruyu Yan

Owen Zhang

Nobline Yoo

Max Gonzalez-Saez

Kylie Zhang

Kathryn Wantlin

Jane Castleman

Beza Desta
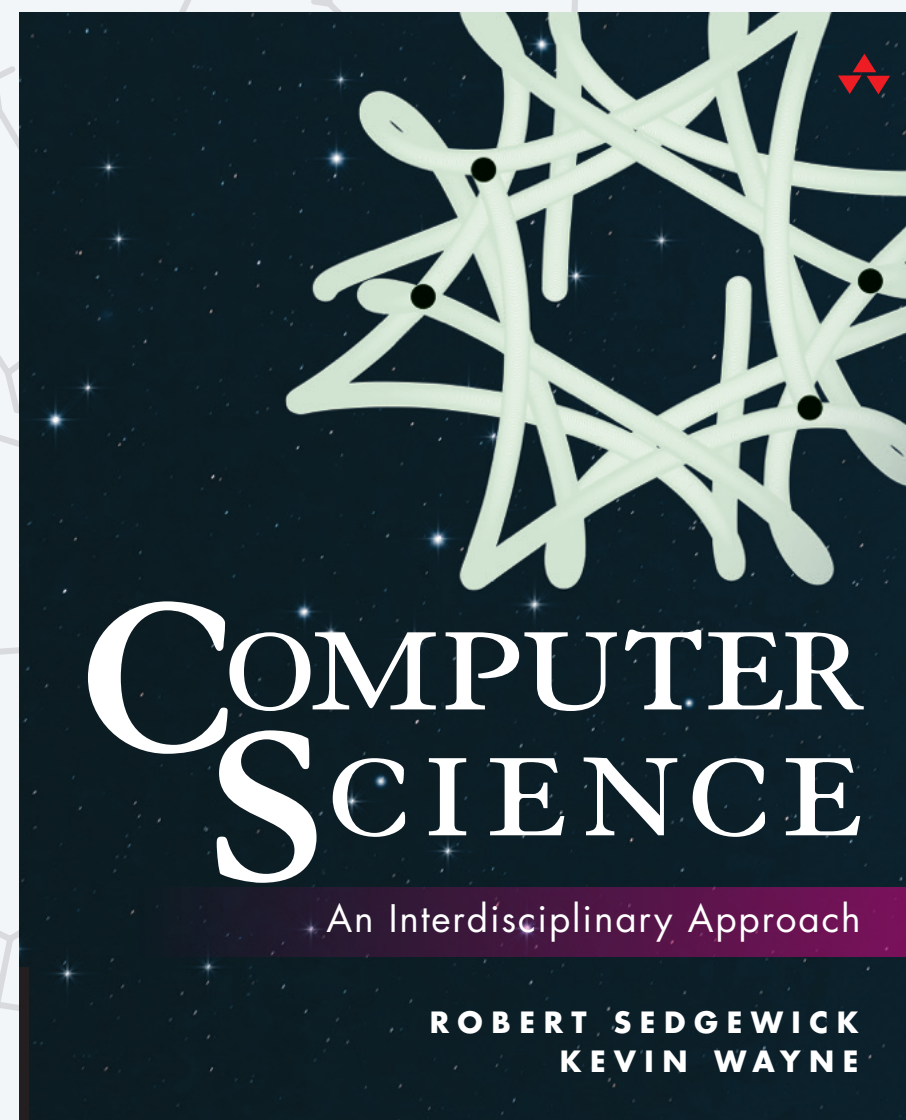
Nicholas Alexander Sudarsky

Berlin Chen

Abhishek Joshi

Fine print

Lecture slides available from Schedule page on course website:
https://www.cs.princeton.edu/courses/cos126/schedule

We will be recording lectures and posting in Canvas.

Because of privacy, compliance, and legal considerations,
you may not record or redistribute recordings of this class.

COMPUTER SCIENCE

An Interdisciplinary Approach

**ROBERT SEDGEWICK
KEVIN WAYNE**

https://introcs.cs.princeton.edu

COS 126, SPRING 2025

▸ *digital revolution*

▸ *course mechanics*

▸ *course resources*
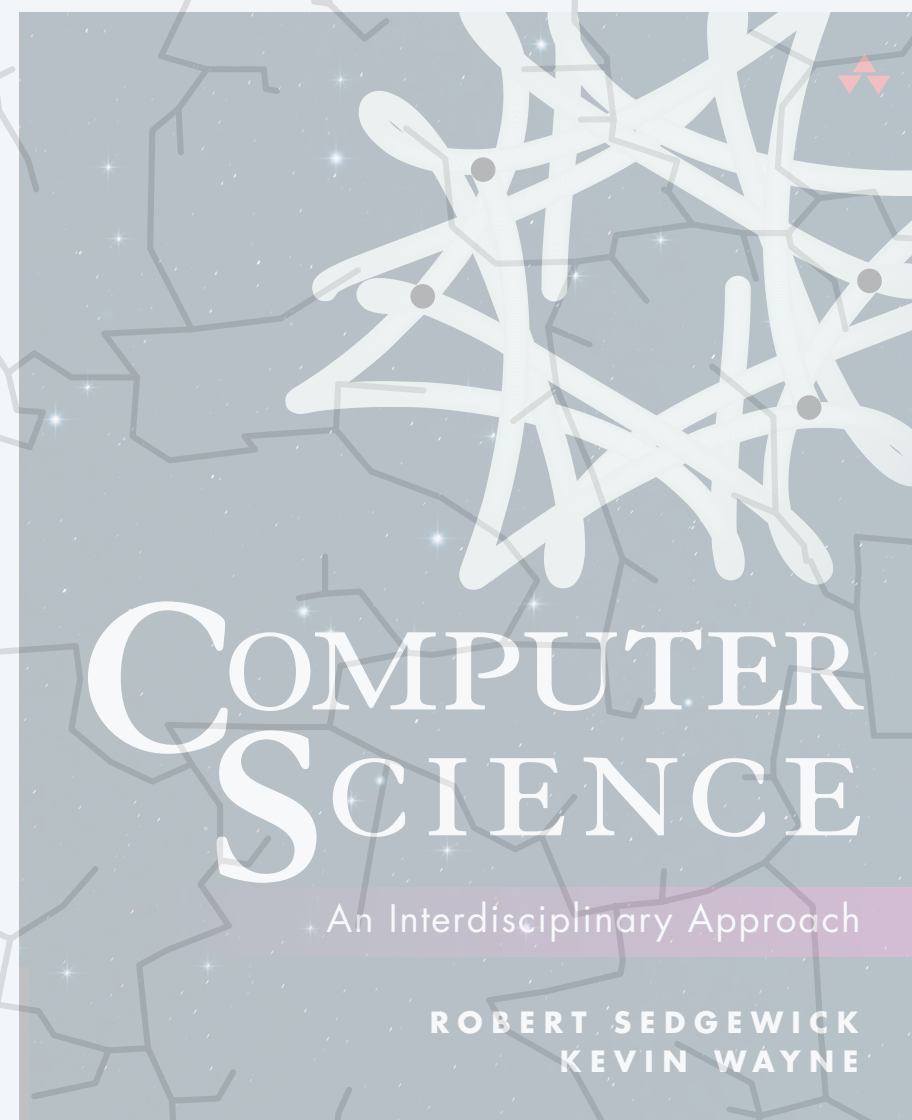
COS 126 course objectives

Goal 1. Read, write, and reason about computer programs.

Goal 2. Apply concepts to science, engineering, and beyond.

Goal 3. Understand key ideas underlying computation and computer systems.

| topic	examples
elements of programming	*built-in data types, conditionals, loops, arrays, I/O*
functions	*user-defined functions, modularity, recursion*
object–oriented programming	*user-defined types, encapsulation, immutability*
algorithms and data structures	*sorting, searching, collections*
computer science	*theory of computing, machine learning*
design of computers	*machine language, boolean logic, circuits*

COS 126, Spring 2025

▸ *digital revolution*

▸ *course mechanics*

▸ *course resources*

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The digital revolution

Key idea. "Everything" can be encoded as a sequence of bits (0s and 1s).

- Numbers and text.
- Pictures, songs, and movies.
- Biometrics.
- 3D objects.
- Computer programs.
- ...
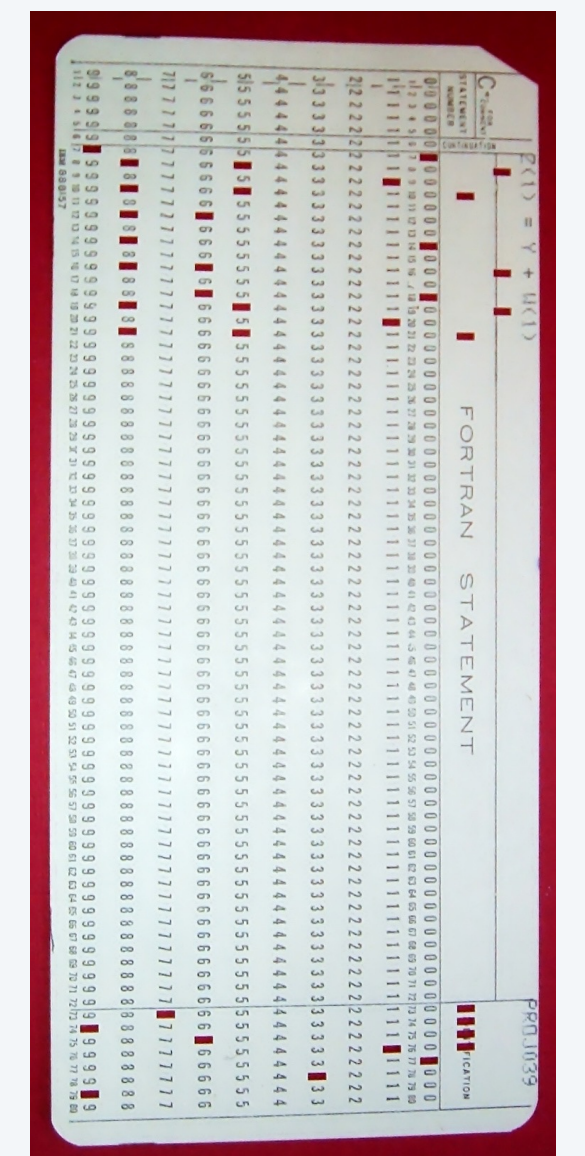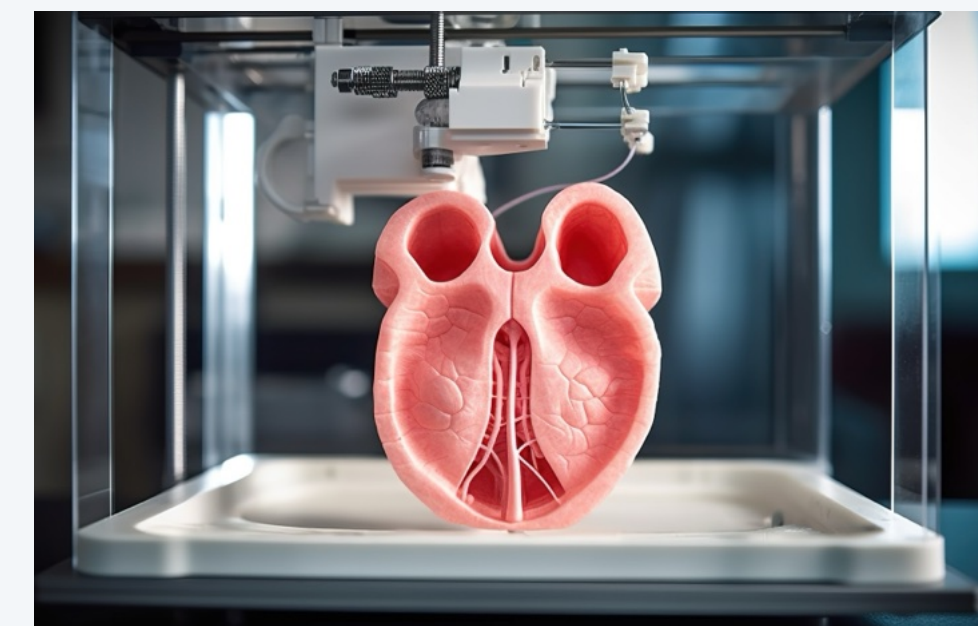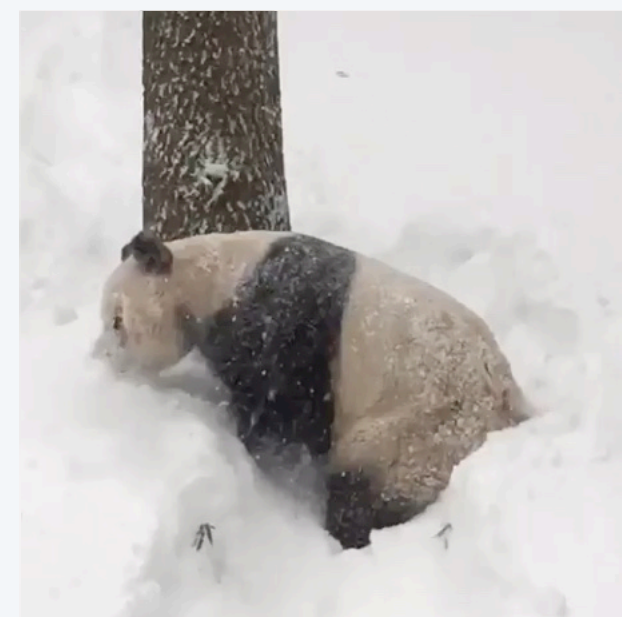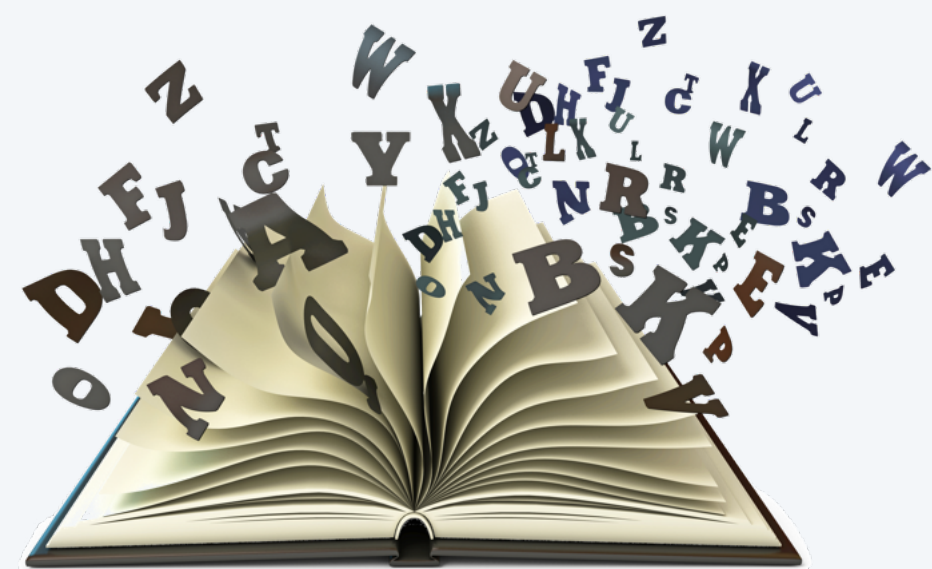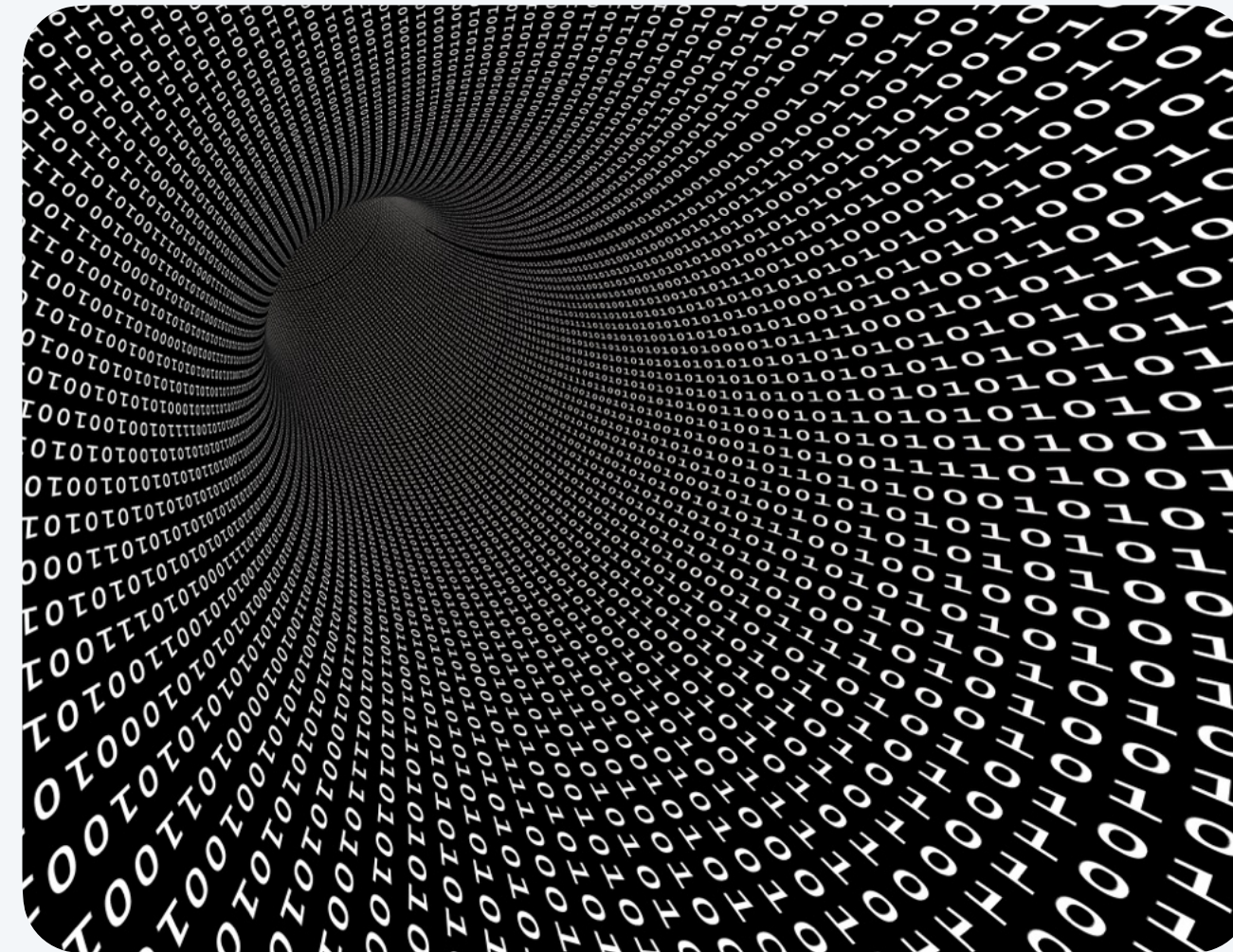
The digital revolution

Key idea. "Everything" can be encoded as a sequence of bits (0s and 1s).

Innovation 1. You can program computers to process bits.

Innovation 2. Devices can use the Internet to send and receive bits.

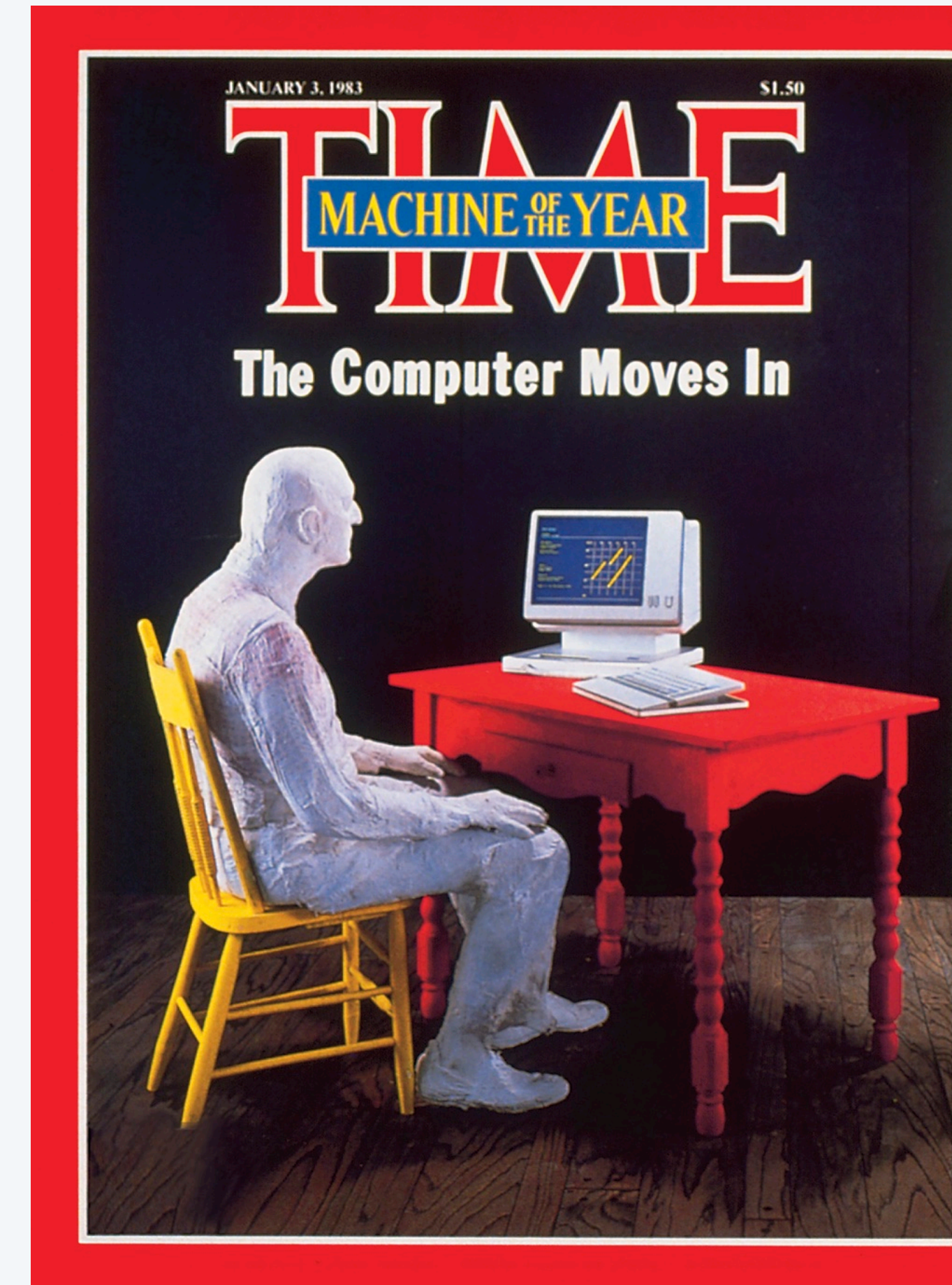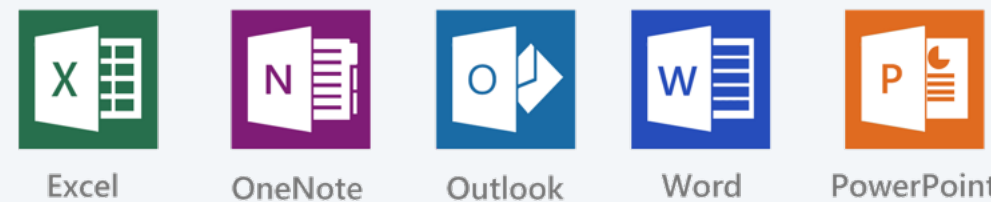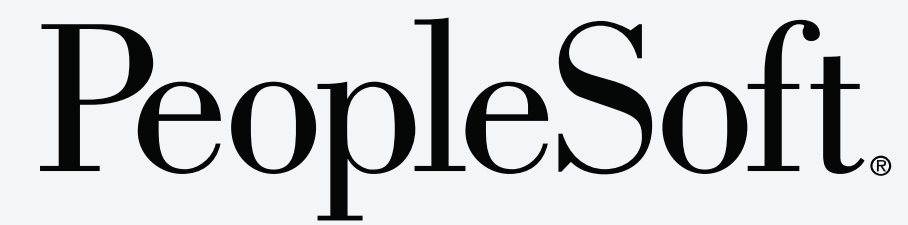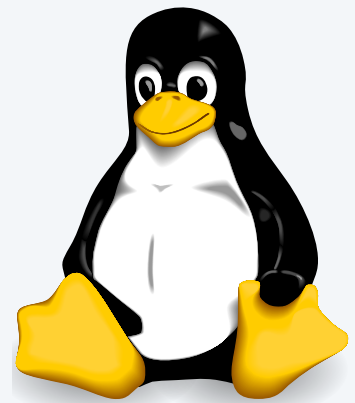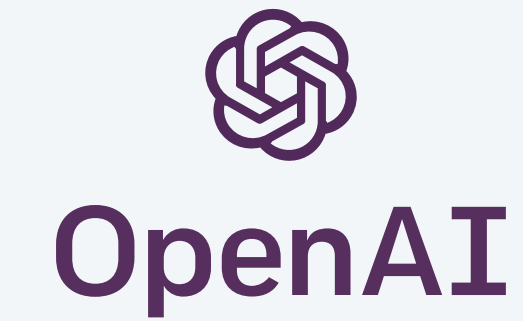" *Computers are incredibly fast, accurate, and stupid;*

  humans are incredibly slow, inaccurate, and brilliant;

  together they are powerful beyond imagination. "
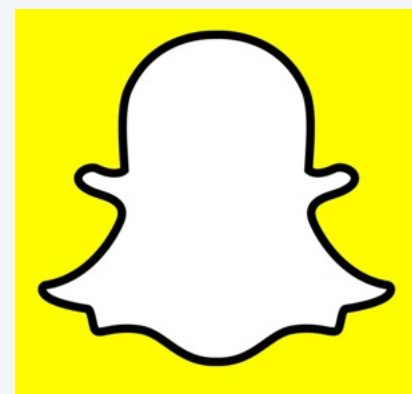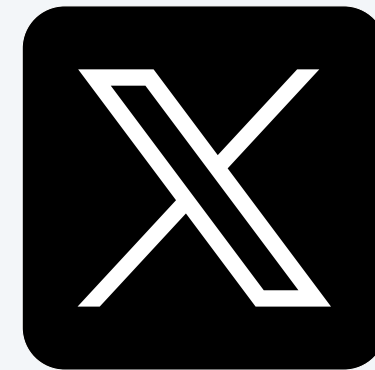
  — *widely misattributed to Albert Einstein*
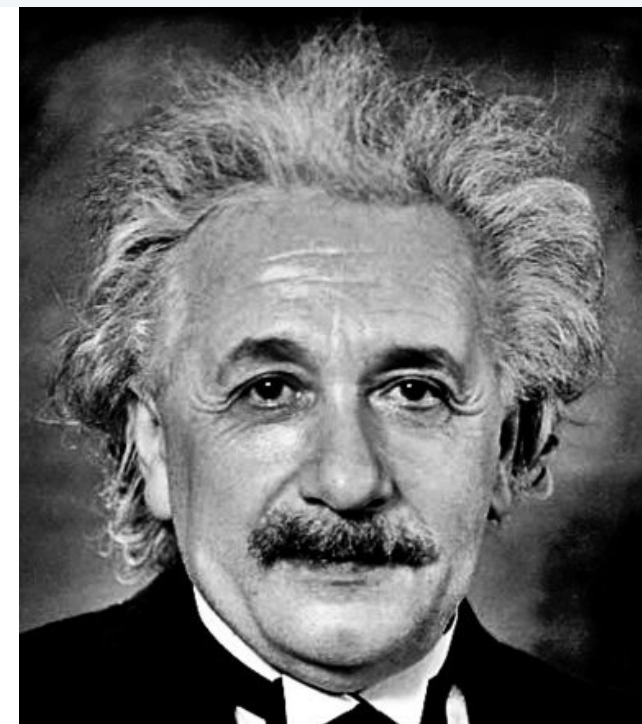
Computers are transforming society

From the way we work …

Computers are transforming society
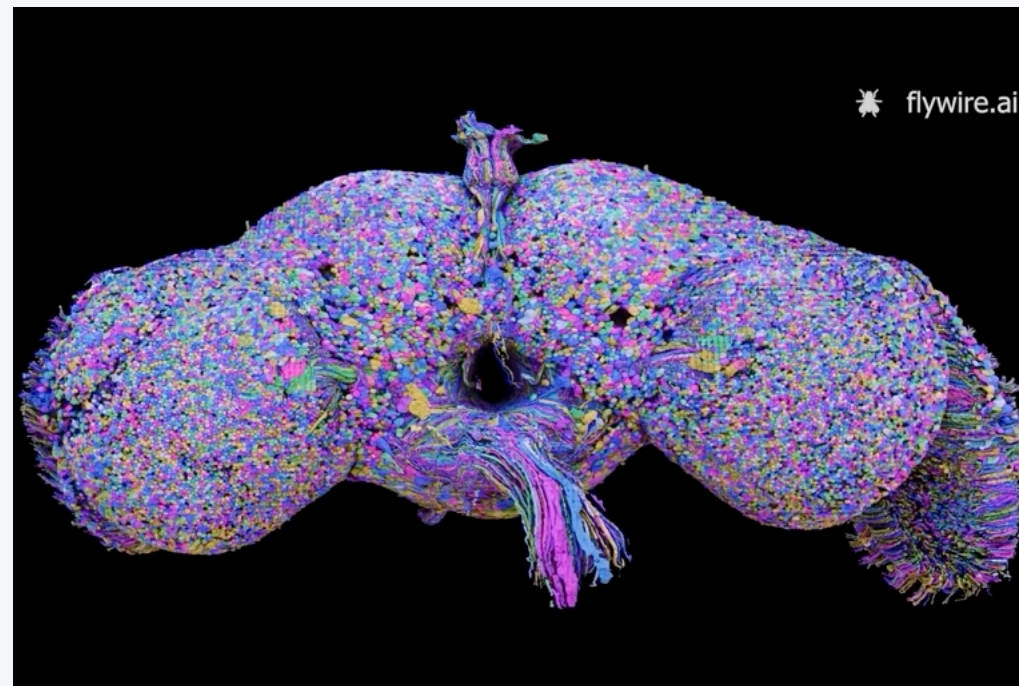
… to the way we live.

Computers are transforming society

From the "new" economy …

Today Wall Street is ruled by thousands of little algorithms, and they've created a new market—volatile, unpredictable, and impossible for humans to comprehend. Photo: Mauricio Alejo
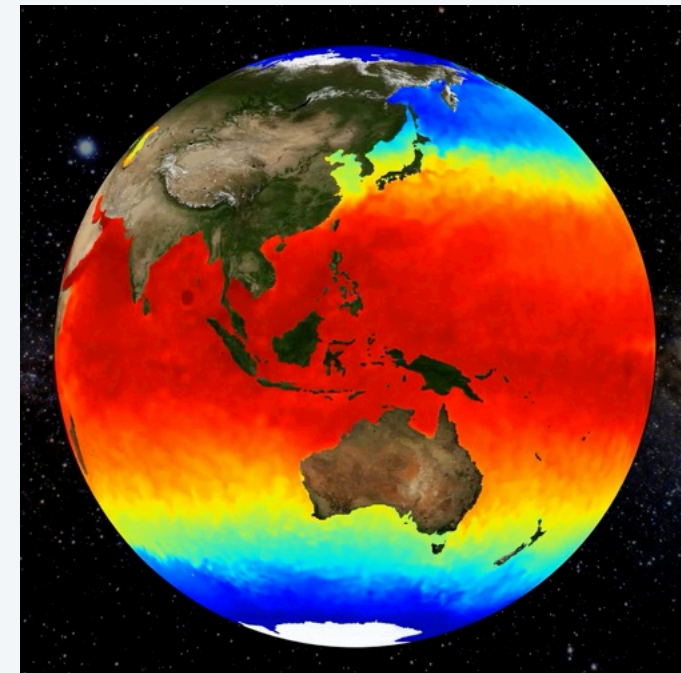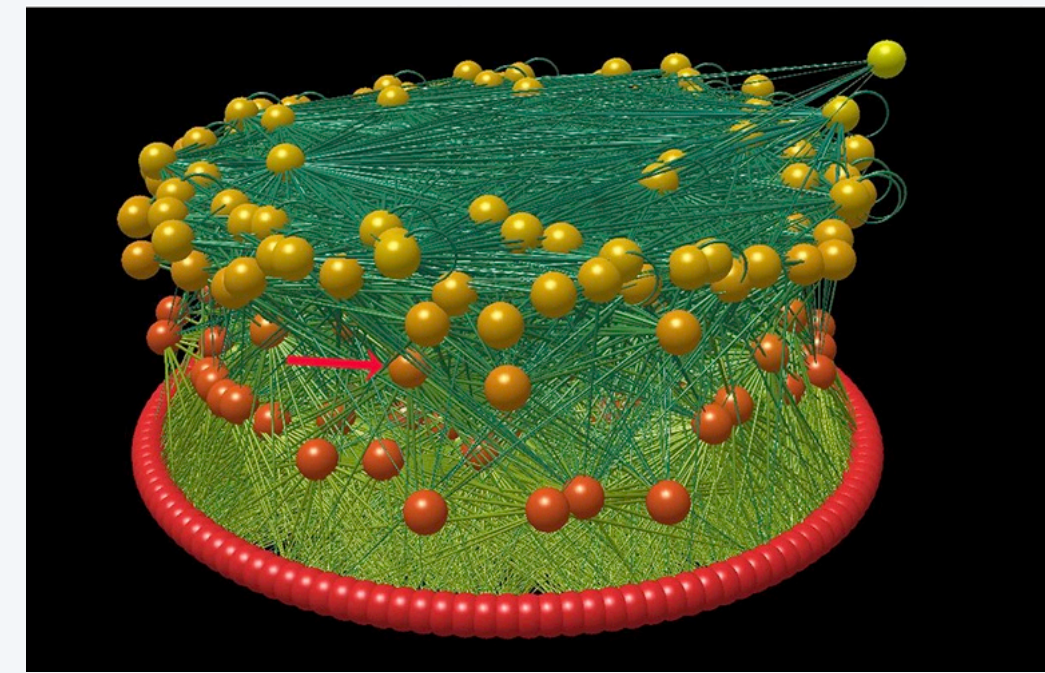
Computers are transforming society

... to the way we do science and engineering.
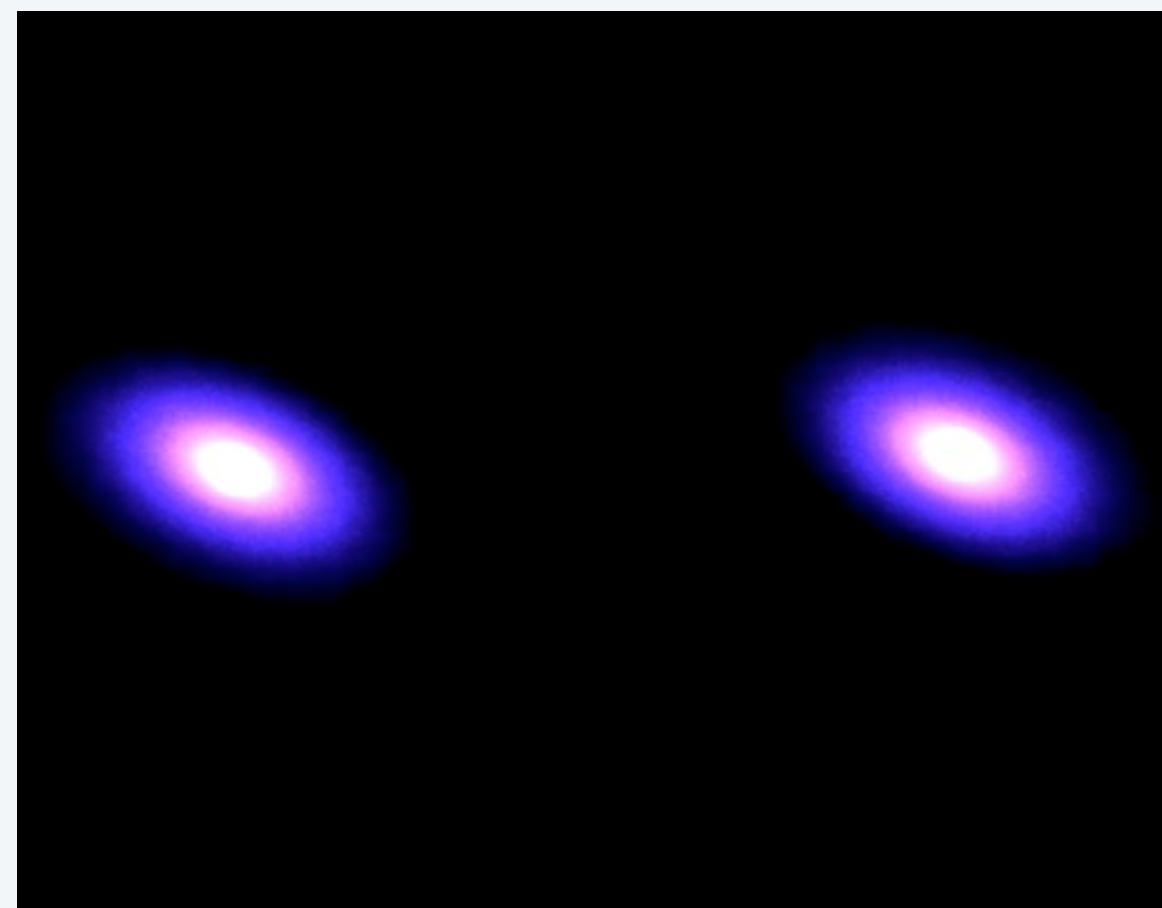

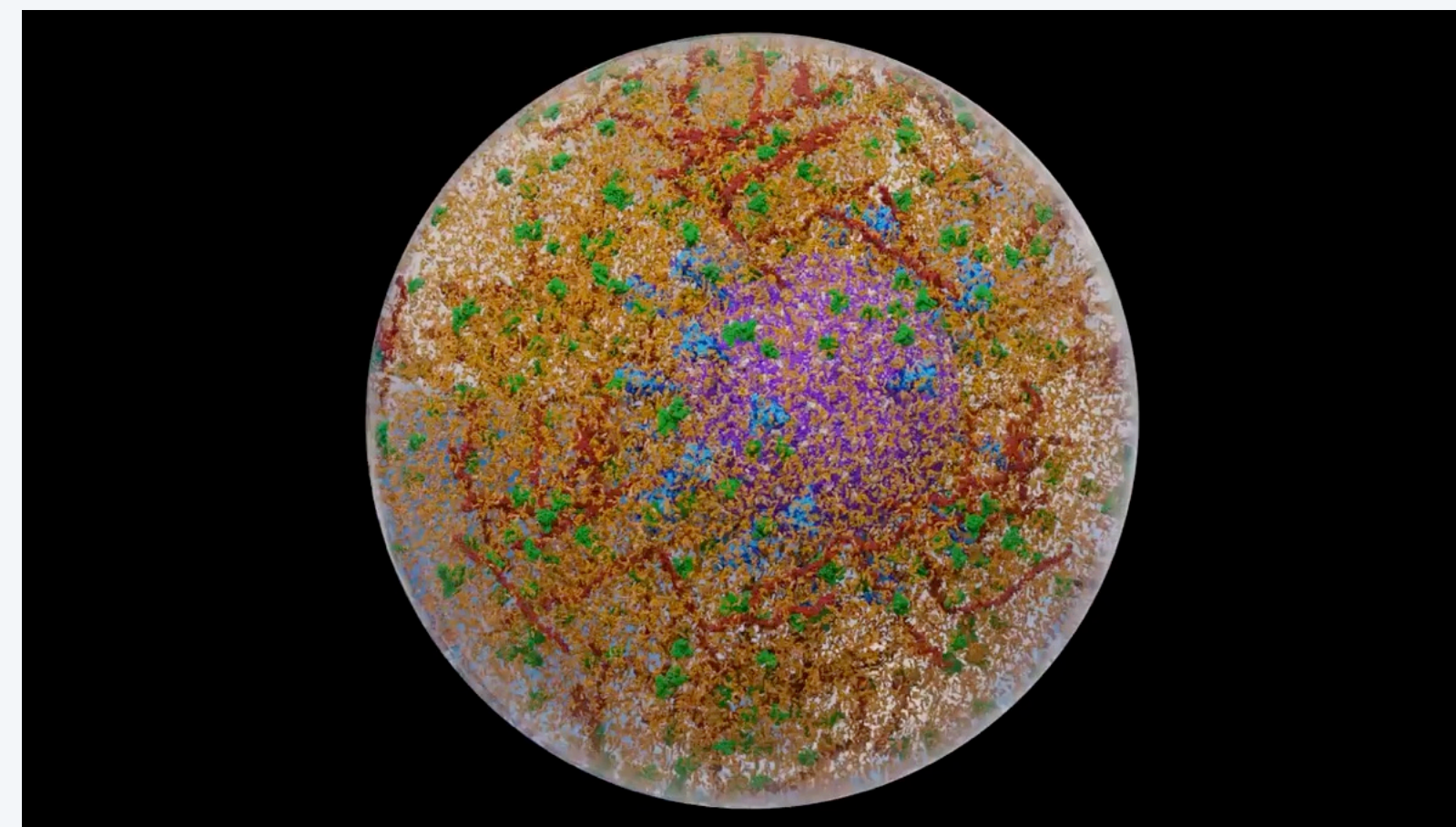**diffusion MRI of brain**

ocean modeling
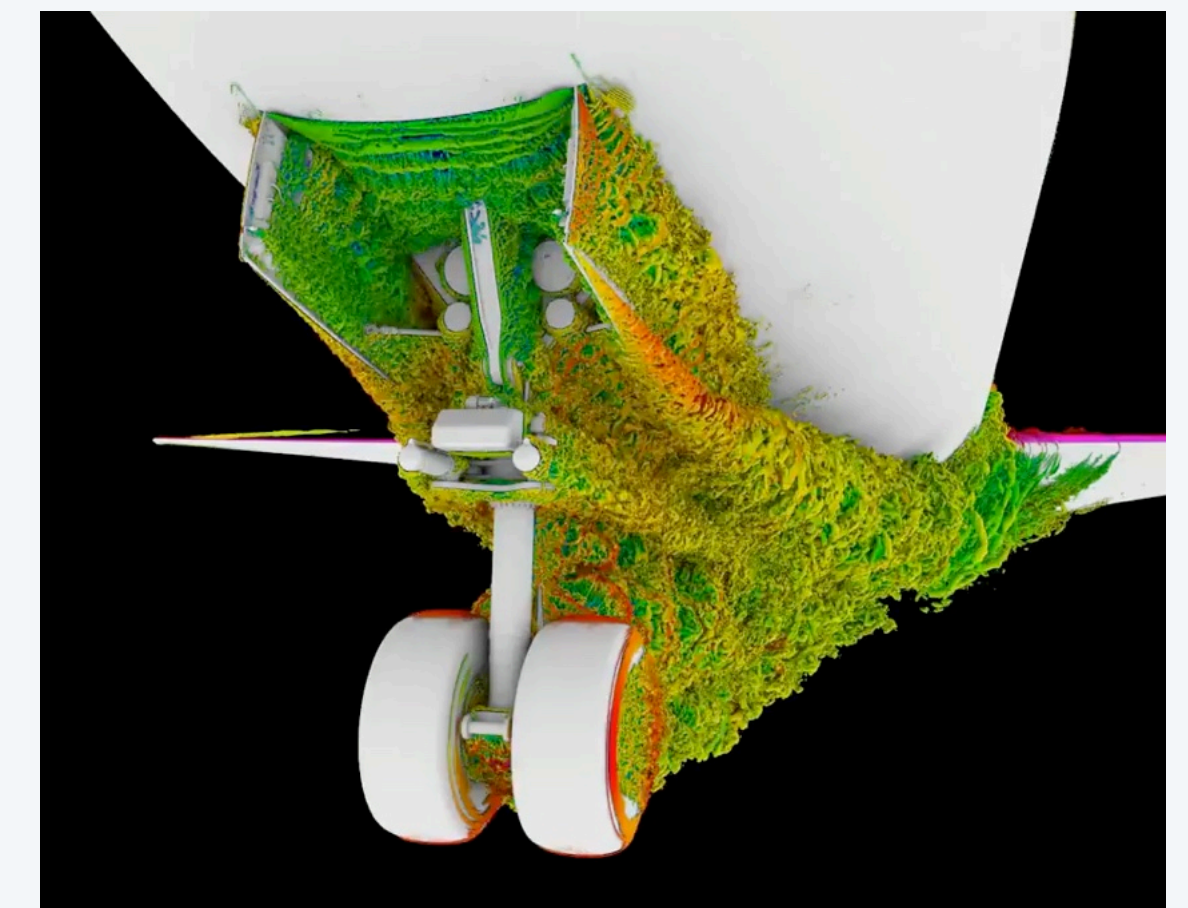
ancestral Pueblo food web
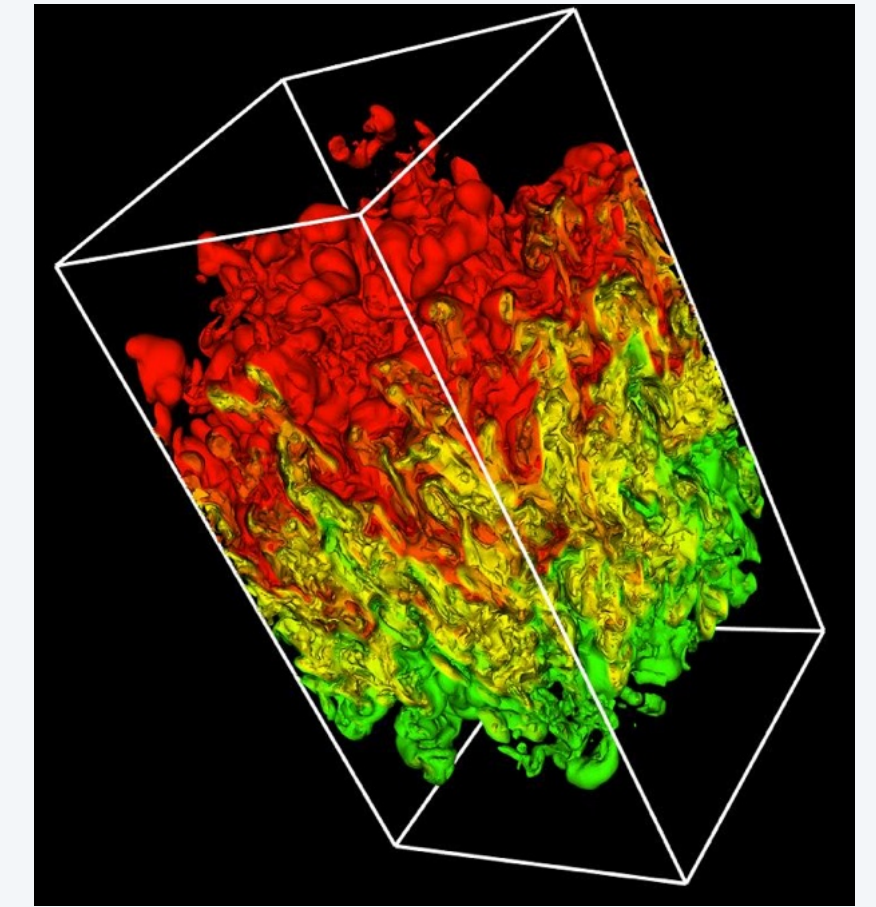
nuclear physics
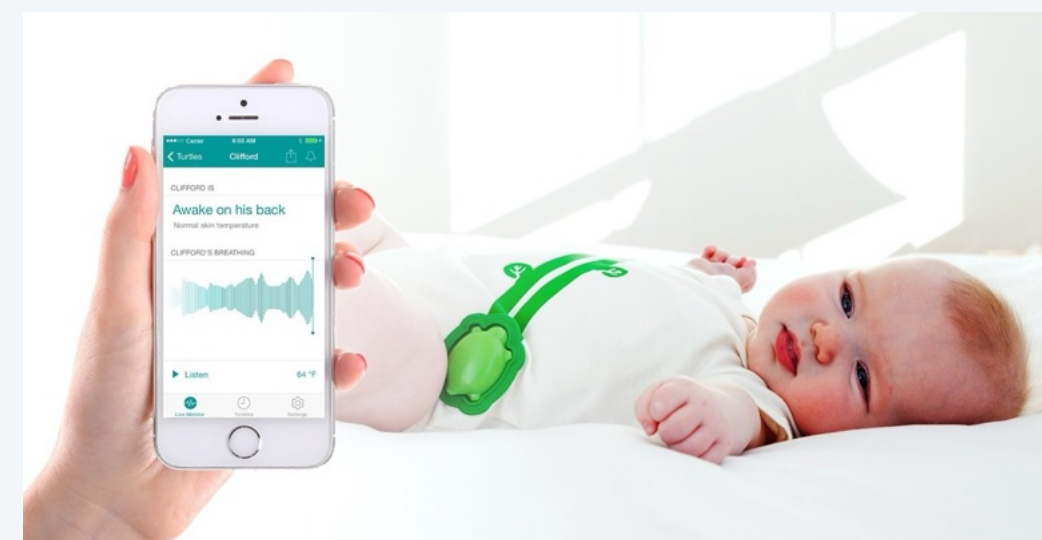
colliding galaxies

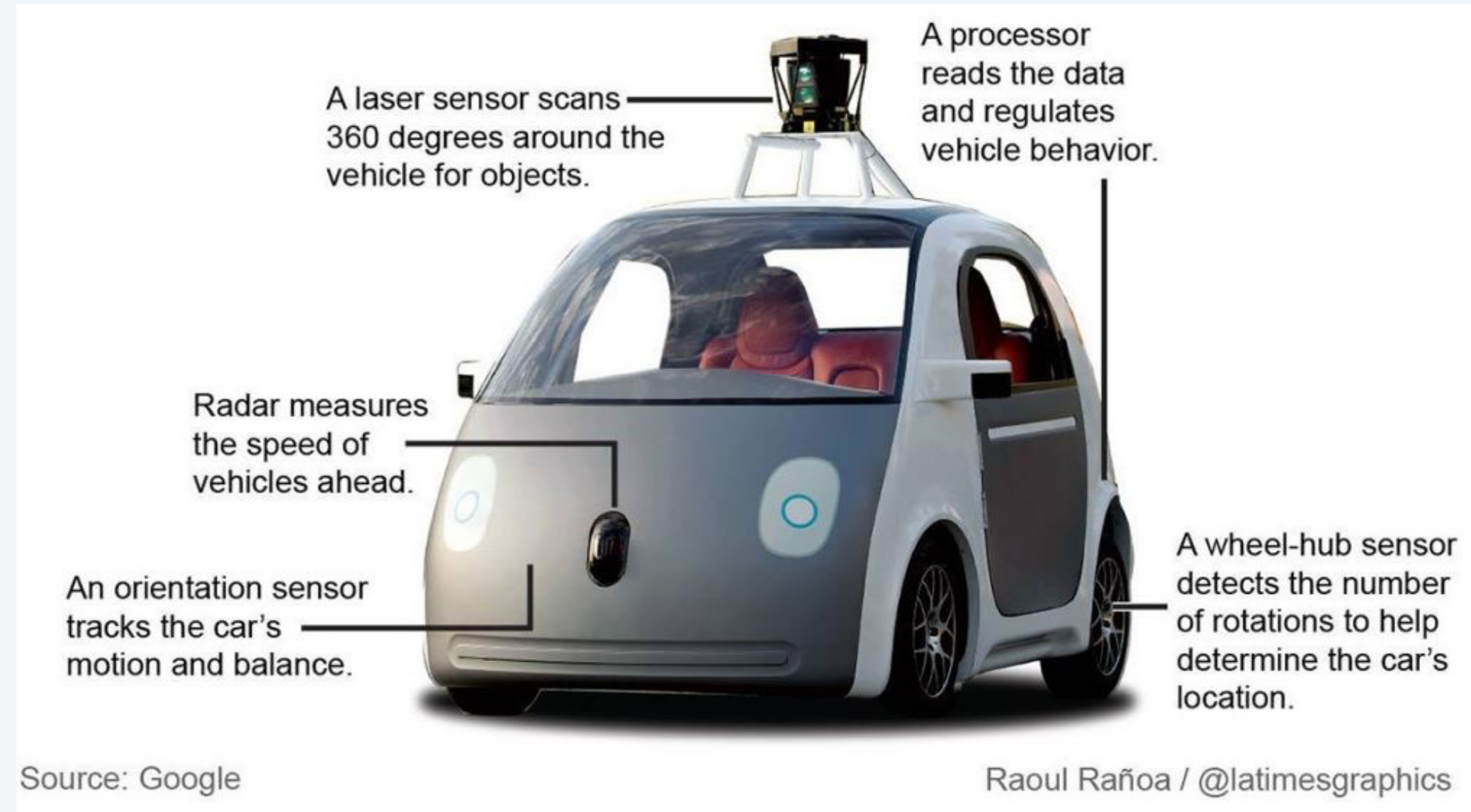**an aerosol droplet containing coronavirus**

airflow over landing gear
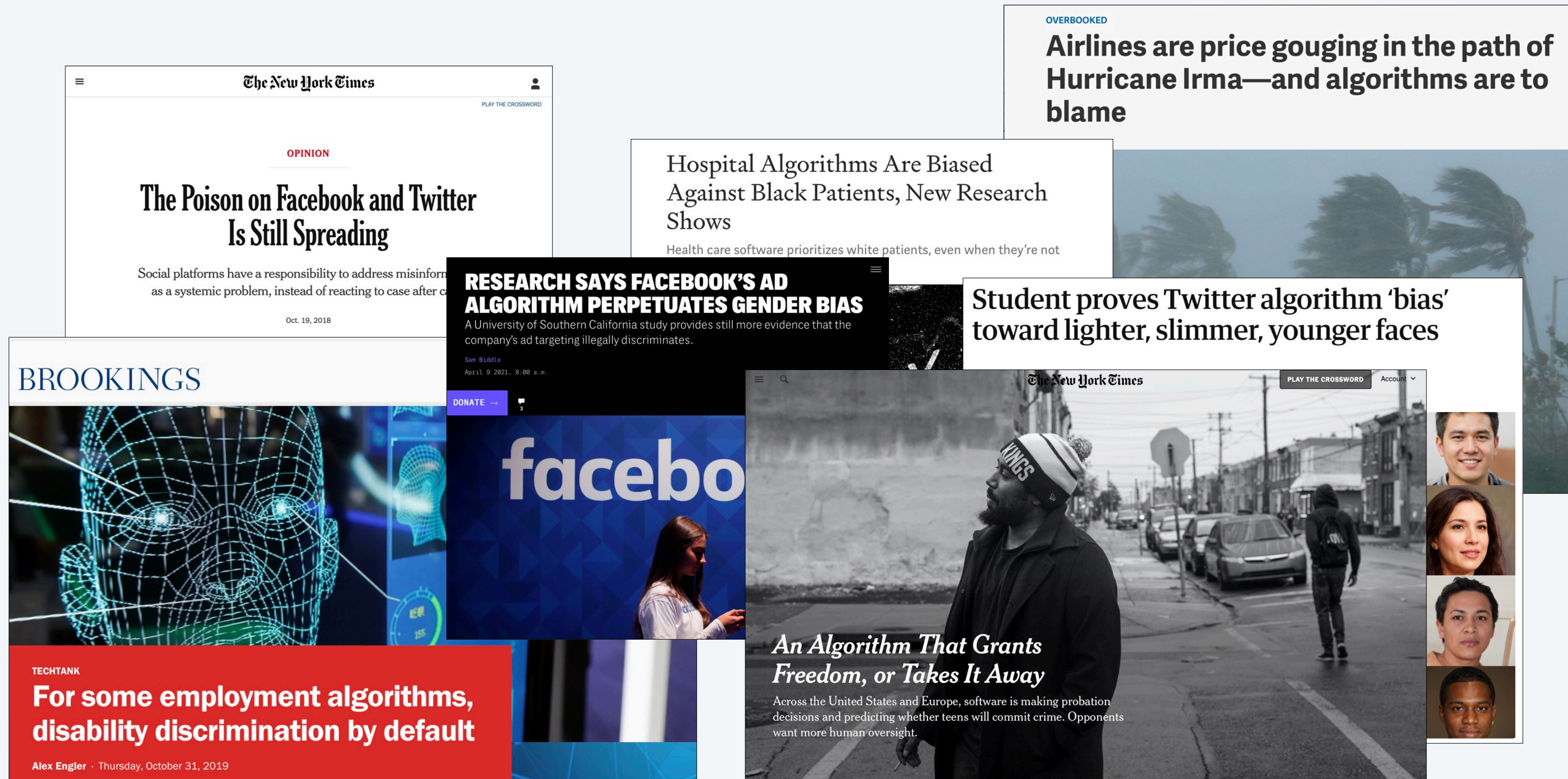
The digital revolution has only just begun

In 2020. 50 billion+ smart connected devices, all developed to collect, analyze, and share data.
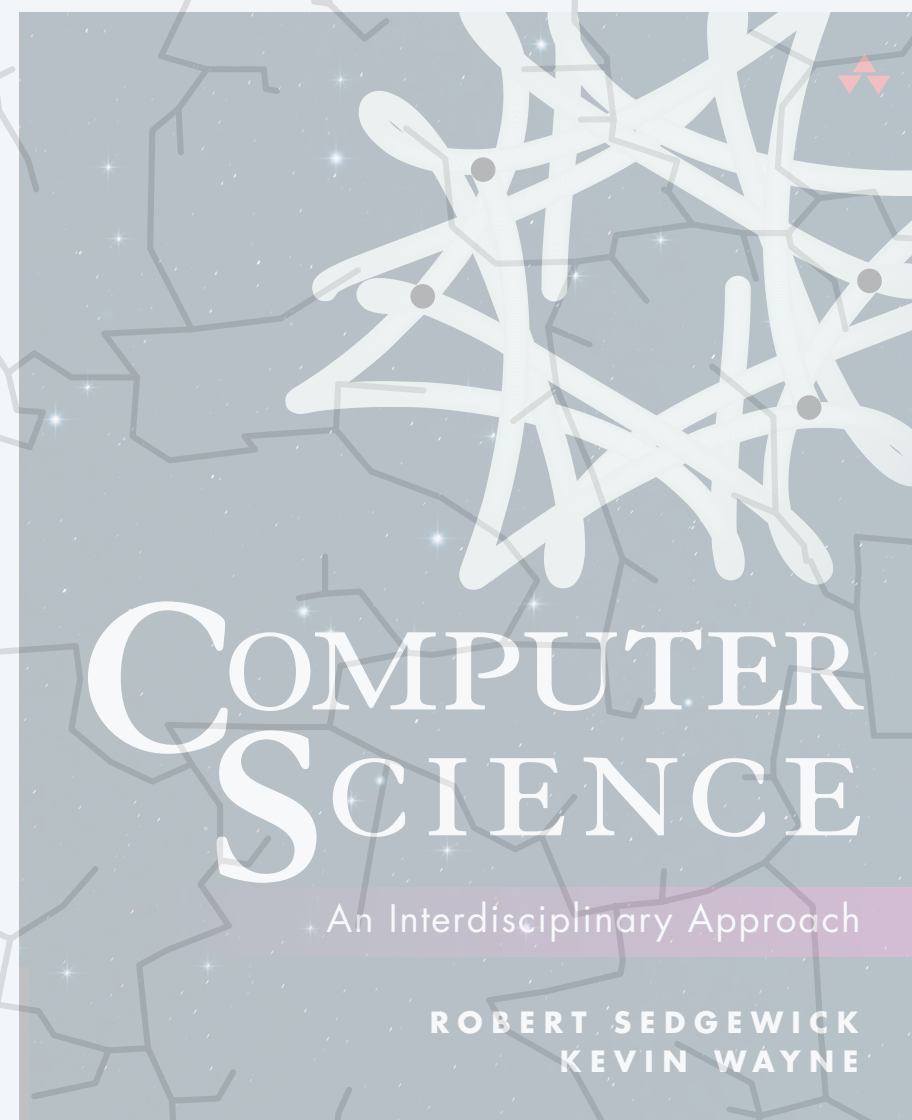
The digital revolution has only just begun

Welcome aboard. You're already a consumer. Now, become a creator!

In the service of humanity. Use your new superpower responsibly!

COS 126, Spring 2025

- ▸ *digital revolution*
- ▸ **course mechanics**
- ▸ *course resources*

https://introcs.cs.princeton.edu

COMPUTER SCIENCE

An Interdisciplinary Approach

ROBERT SEDGEWICK
KEVIN WAYNE

Lectures

Live lectures. [MW 1:30–2:50pm] Introduce new material.

Questions. You are encouraged and expected to participate.

- Raise your hand and ask a question. ⟵ *carpe diem!*

- Ask (anonymous or not) in Ed. ⟵ *course staff will monitor forum*
(may answer or share with class)

Electronic devices. Permitted *only* to support lecture.

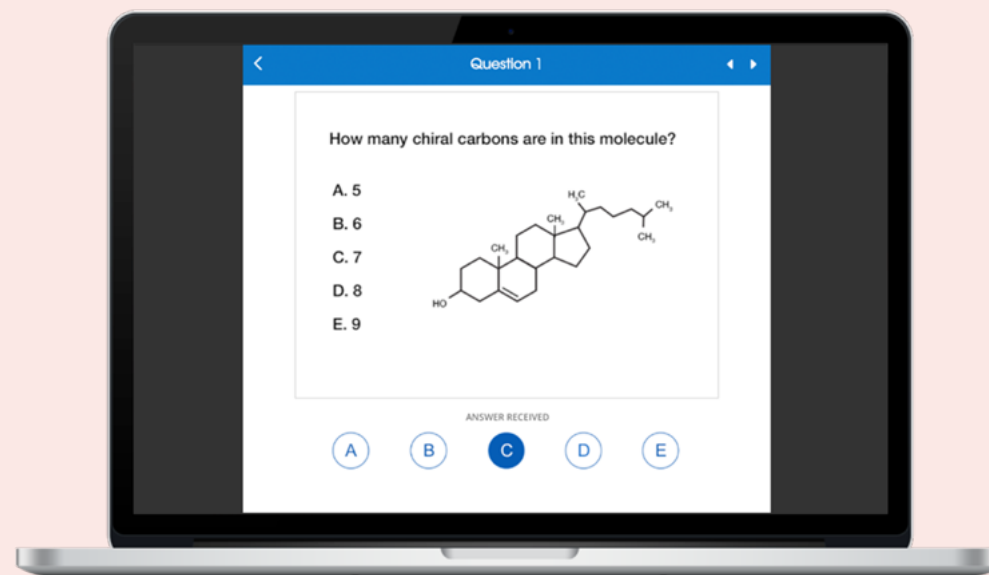*viewing slides, taking notes, iClickers, …*

iClicker. To earn participation credit:

- Create iClicker Cloud account. ⟵ *use Canvas-preferred email*

- Register for course.

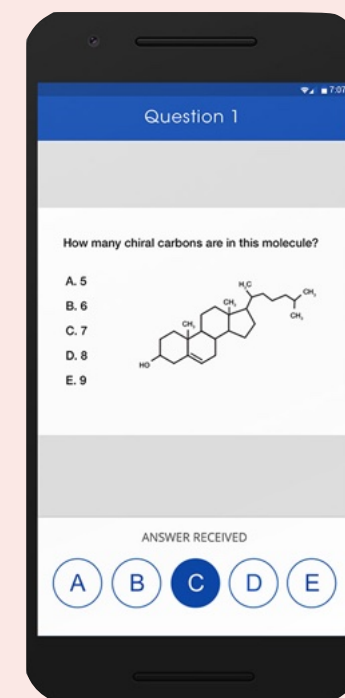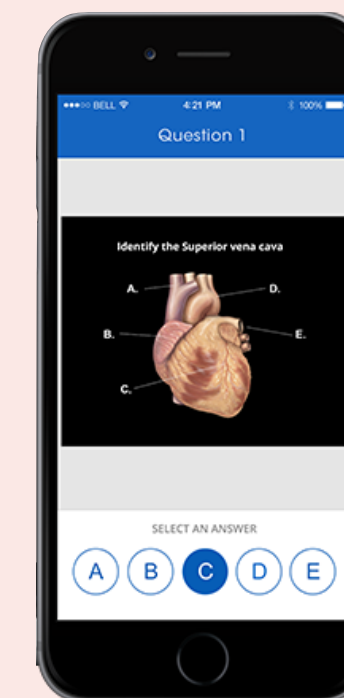- Answer multiple choice questions during lecture.

Which iClicker device are you using?

A. Web

B. iPhone

C. Android

Precepts

Active learning. Discussion, problem solving, pair programming, …

- 50-minute precepts. ← *same content; different pace*
- 80-minute precepts.
- Raspberry Pi 🍓 precept (P14).

if interested, see
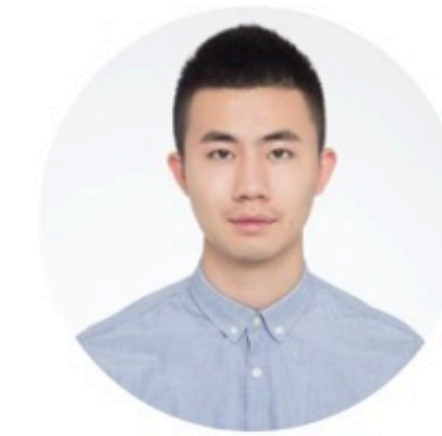*Prof. Alan Kaplan after class*

Donna Gabai

Alan Kaplan

Tanvi Namjoshi

Ruyu Yan

Owen Zhang

Nobline Yoo

Max Gonzalez-Saez

Kylie Zhang

Kathryn Wantlin

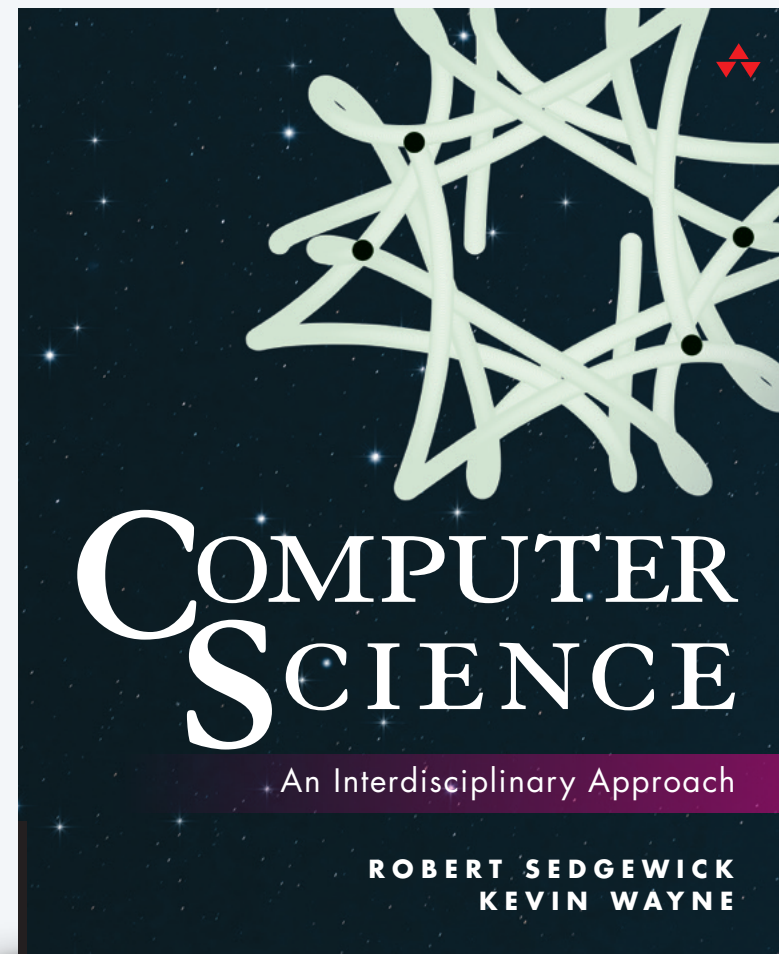Jane Castleman

Beza Desta

Nicholas Alexander Sudarsky

Berlin Chen

Abhishek Joshi

Course textbook

Textbook readings (required). *Computer Science: An Interdisciplinary Approach*
by R. Sedgewick and K. Wayne, Addison–Wesley Professional, 2016.

A+

Programming assignments (37.5%). Assigned weekly.

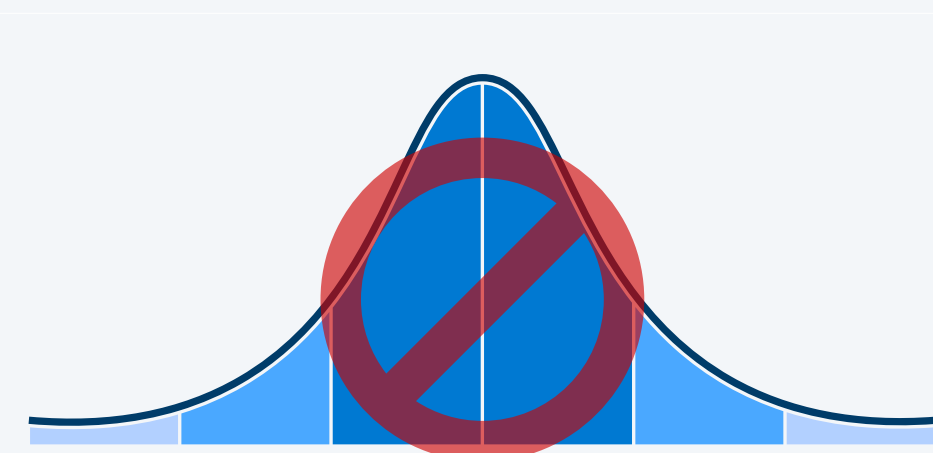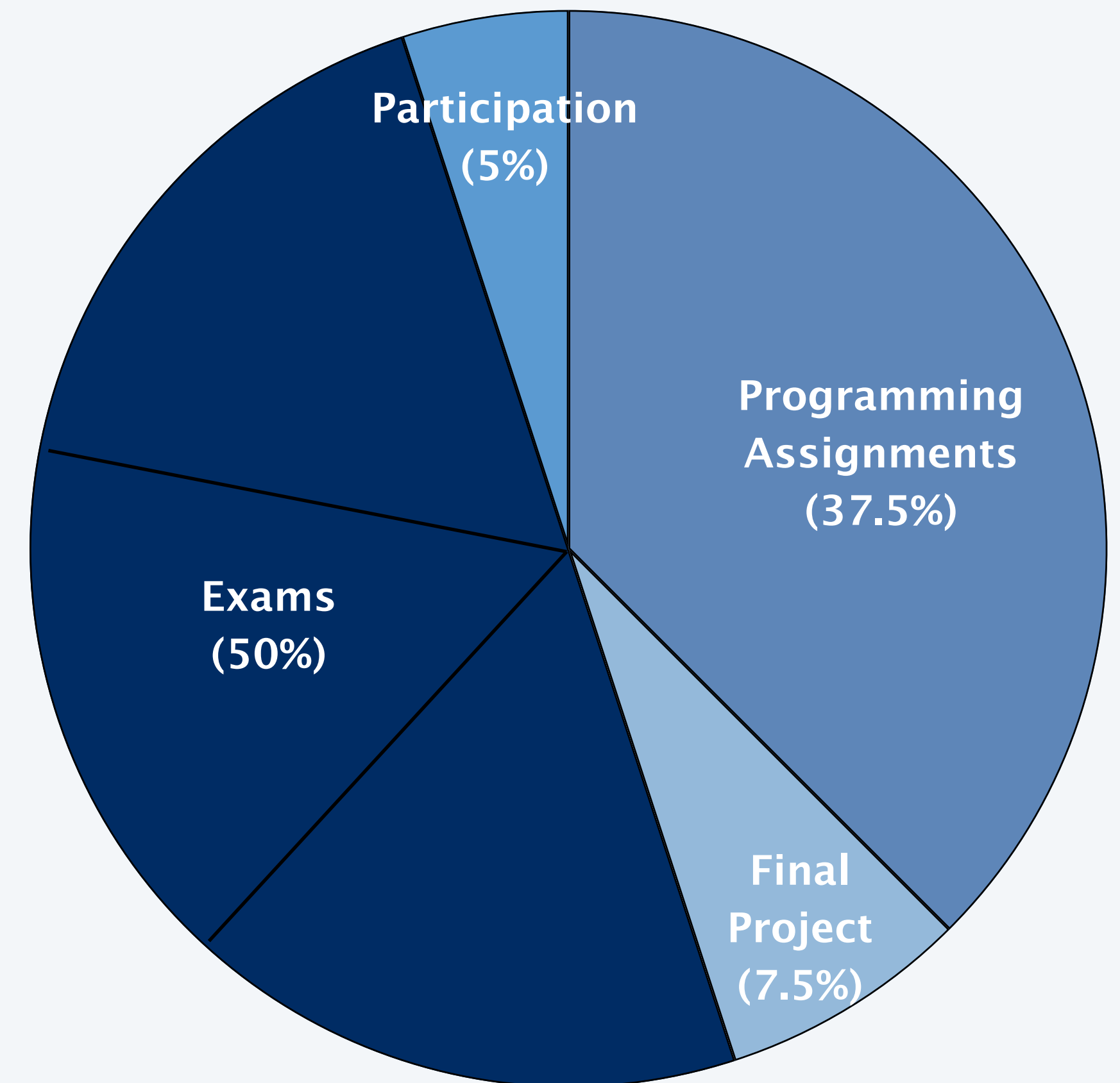Final project (7.5%). Capstone programming assignment.

Exams (50%) – equal weights:

- Two written exams.
- One programming exam.

during lecture time slot
(mark your calendars)

Participation (5%). Participate in lectures/precepts.

Course grades. Uncurved (no rounding).

grade	percentage
A	93.00
A–	90.00
B+	87.00
⋮	⋮

Programming assignments

Programming. An essential part of the experience in learning CS.

Desiderata.

- Illustrate a fundamental CS concept.
- Apply a new programming construct.
- Highlight the role of computation in an important domain.
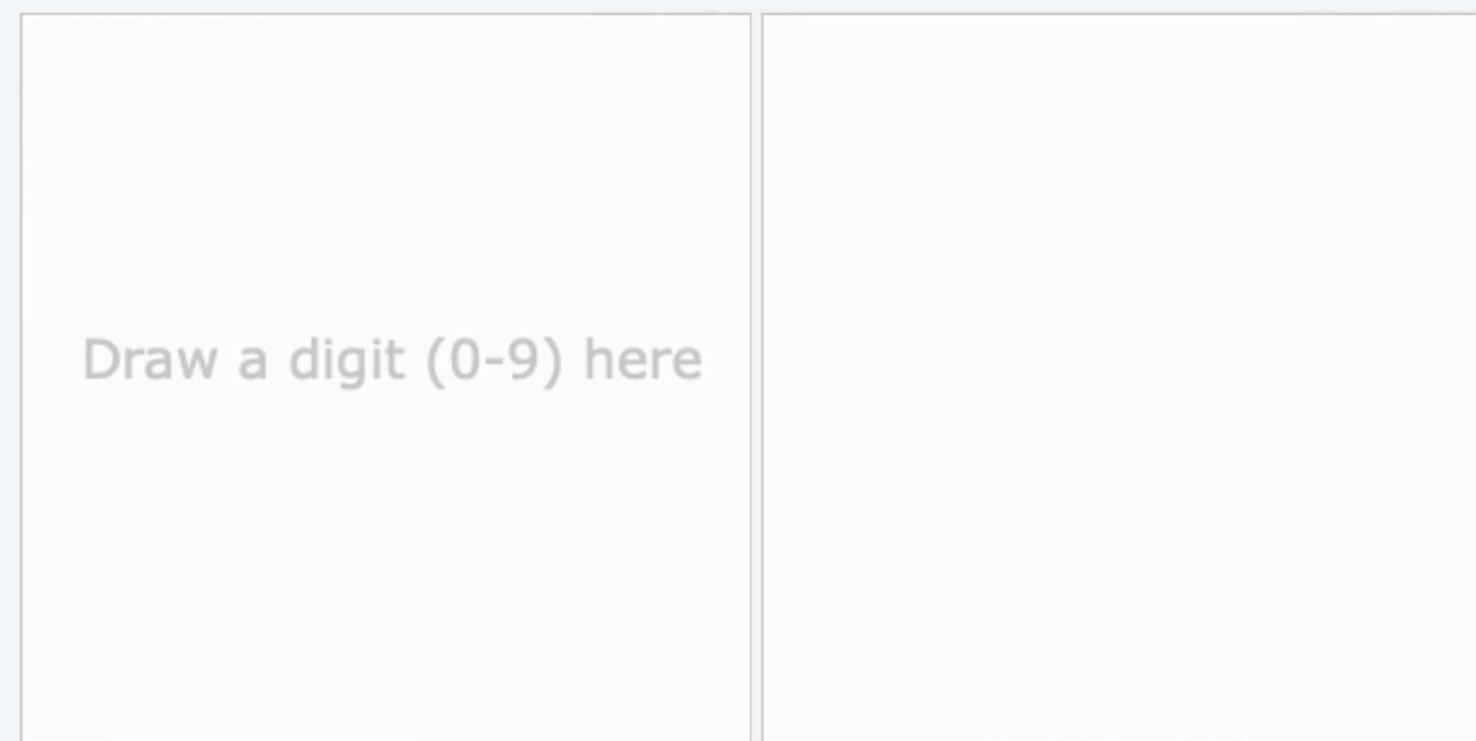- You solve the problem from scratch, on your own computer!
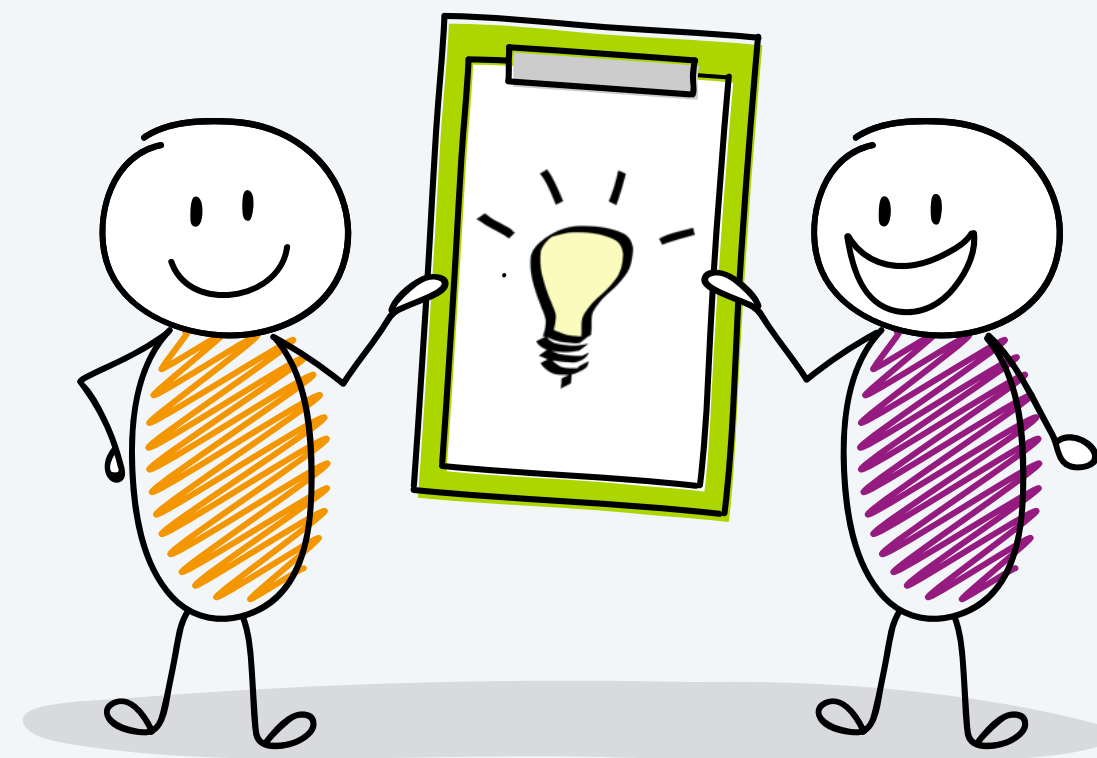
Image Classifier
(assignment 6)

Guitar Hero
(assignment 7)

Programming assignments: collaboration policies
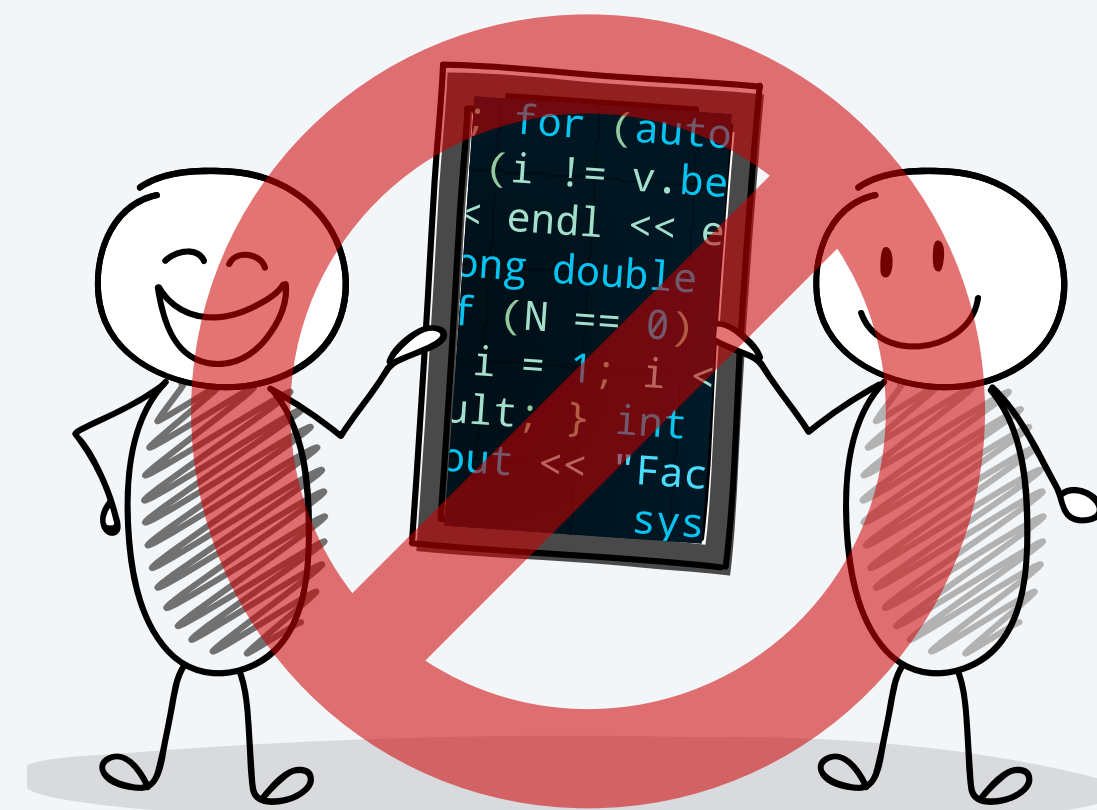
Executive summary.

- Do discuss concepts with others.
- Do acknowledge any collaboration with others.
- Do partner with a classmate (on designated assignments).
- Do not copy code from others (or generative AI tools).

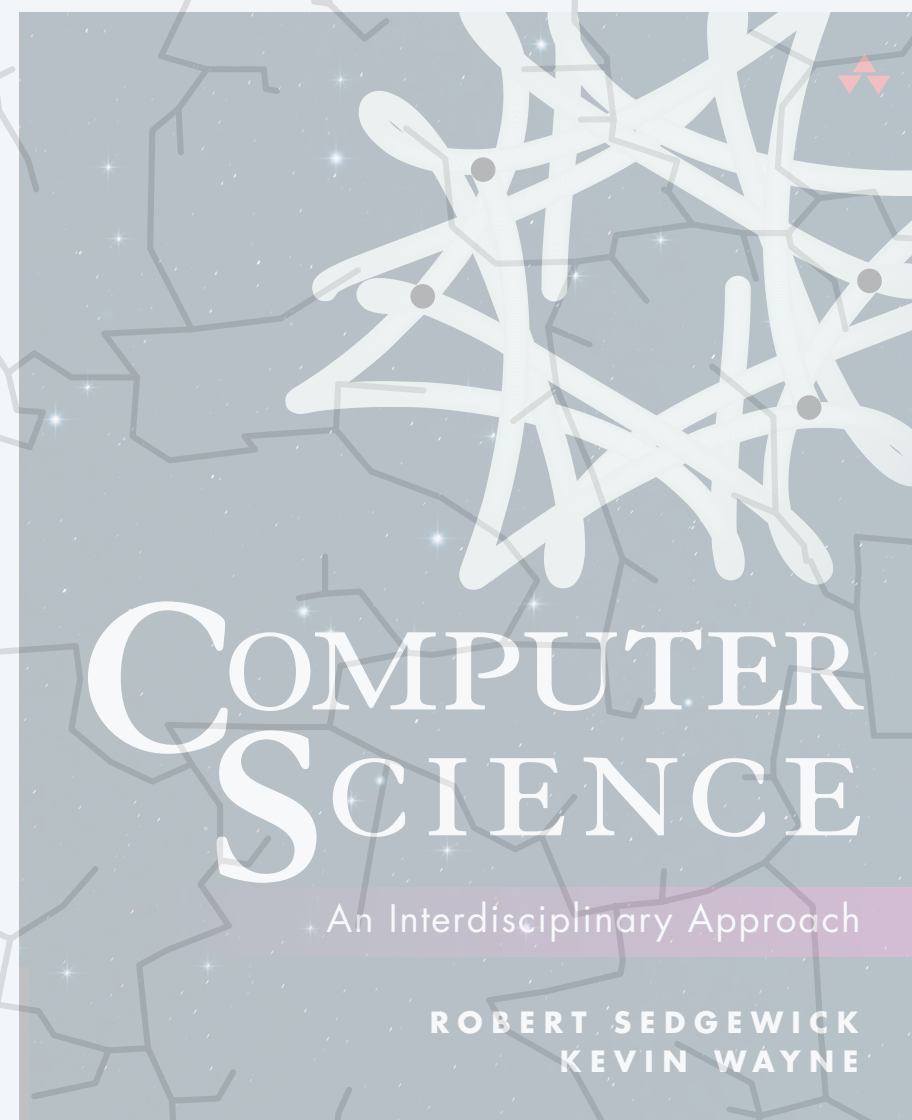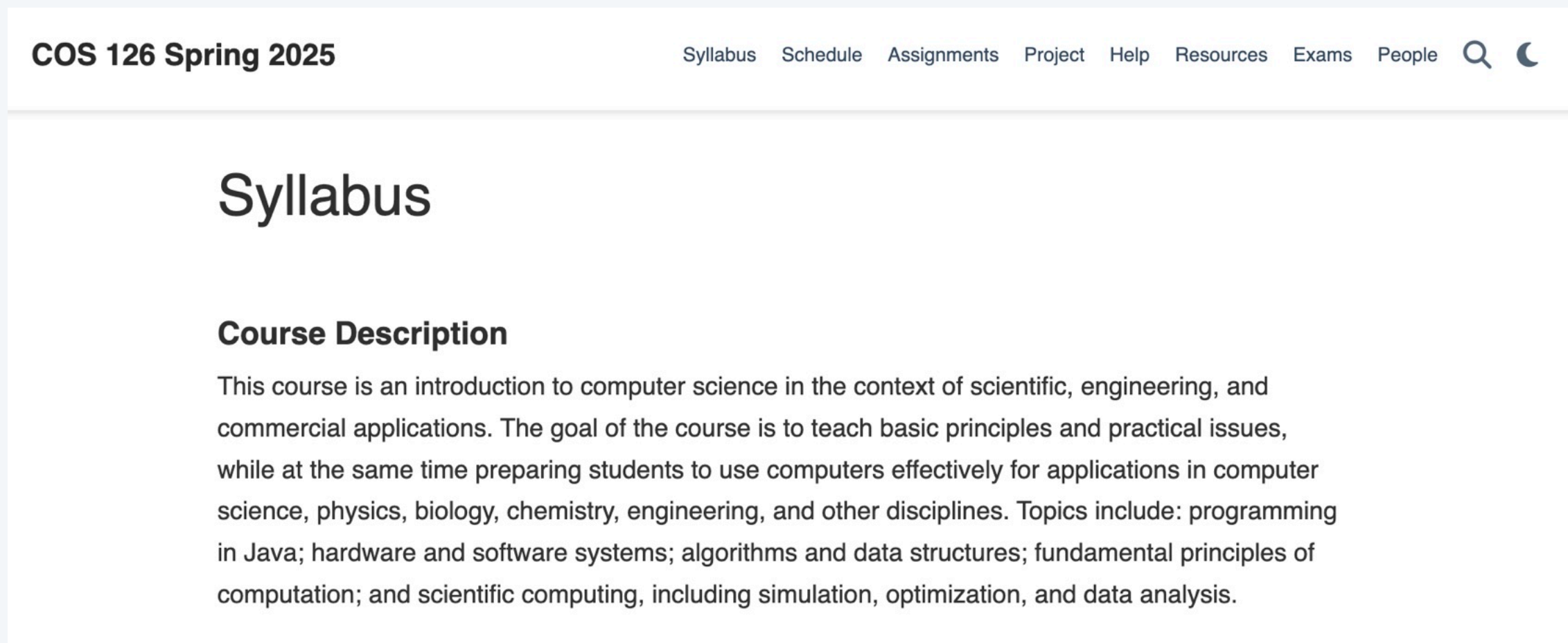Full details. See course syllabus.

share ideas

not code

https://introcs.cs.princeton.edu

COS 126, Spring 2025

‣ *digital revolution*

‣ *course mechanics*

‣ **course resources**

Resources (web) 🌐

Course website.

- Syllabus and course policies.
- Lecture slides.
- Programming assignments.
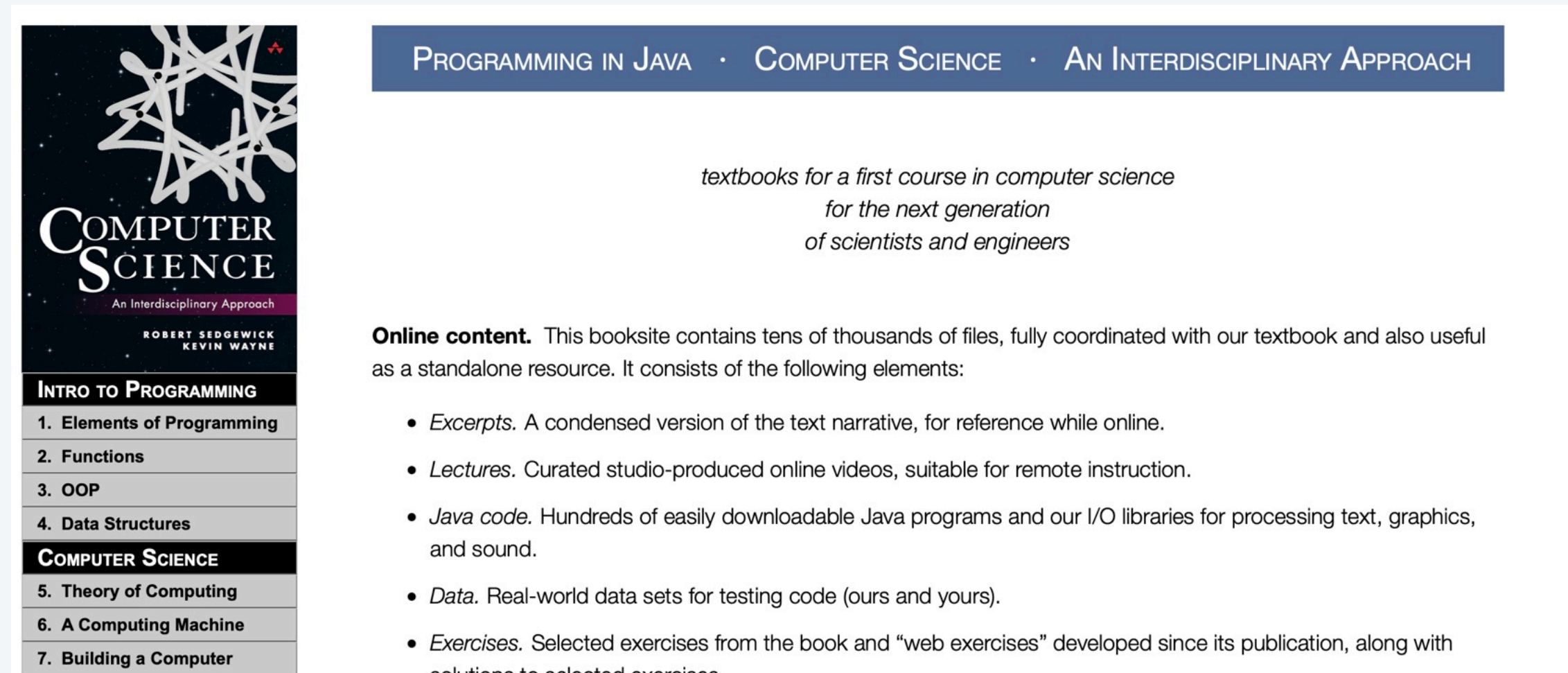- Exam archive.
- Getting help.
- …

https://www.princeton.edu/~cos126

Booksite.

- Download code from book.
- Brief summary of content.
- For use while online.

https://introcs.cs.princeton.edu

Resources (people)

Ed Discussion forum. ⟵ *please use Ed, not email*

- Access via link in Canvas
- Read Ed Discussion FAQ for etiquette.

Office hours. ⟵ *protip: attend*

- Longer discussions.
- See course website for schedule.

Intro COS Lab. ⟵ *opens Friday*

- Run by undergrads.
- For help with debugging.

McGraw group drop-in study halls.

- Led by undergrads.
- For help with concepts.

https://www.princeton.edu/~cos126

Pulkit Singh '20

https://introlab.cs.princeton.edu

The McGraw Center
for Teaching & Learning

**https://mcgraw.princeton.edu/undergraduates**

Resources (programming environment)

Recommended IDE. Custom IntelliJ environment. ⟵

Use the newest COS126 version!
- *See Assignment 0 installation instructions.*
- *See Lab TAs for troubleshooting.*

- Embedded Bash terminal.

- Autoformat, autoimport, autocomplete, …

- Continuous code inspection.

- ~~AI assistant.~~ ⟵ *not in this course*

- …

Resources (ed tech)
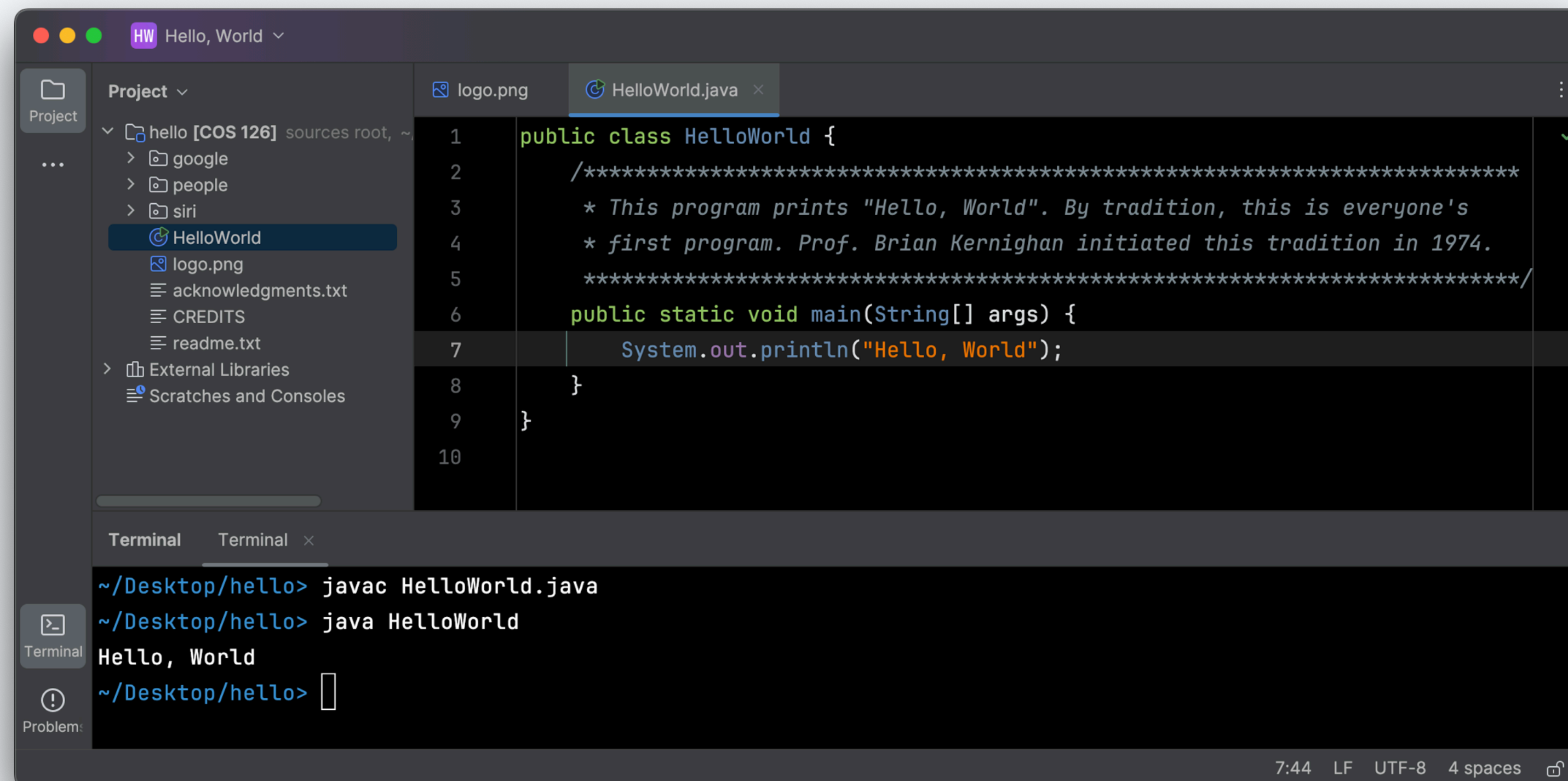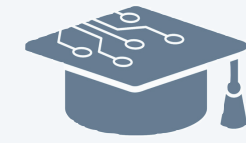
Platform	What
Ed	*discussion forum, precept exercises* ← *also use for communication with course staff*
IntelliJ	*Java IDE*
TigerFile	*programming assignment submissions*
codePost	*programming assignment feedback*
Gradescope	*written exam feedback*
Canvas	*grades, lecture recordings*
iClicker	*in-class polls*
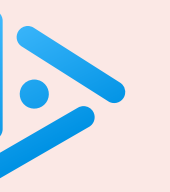
If I don't understand a fundamental programming concept, what should I do?

A.   Attend office hours.

B.   Get help from a lab TA.

C.   Post a question on Ed Discussion.

D.   Email/text my preceptor.

E.   Copy a classmate's solution.

A typical week 📅

introduce new material

Sun	Mon	Tue	Wed	Thu	Fri	Sat
19	20	21	22	23	24	25
26	27 **Lecture**	28 **Precept**	29 **Lecture**	30 **Precept**	31	1
2 **Assignment**						
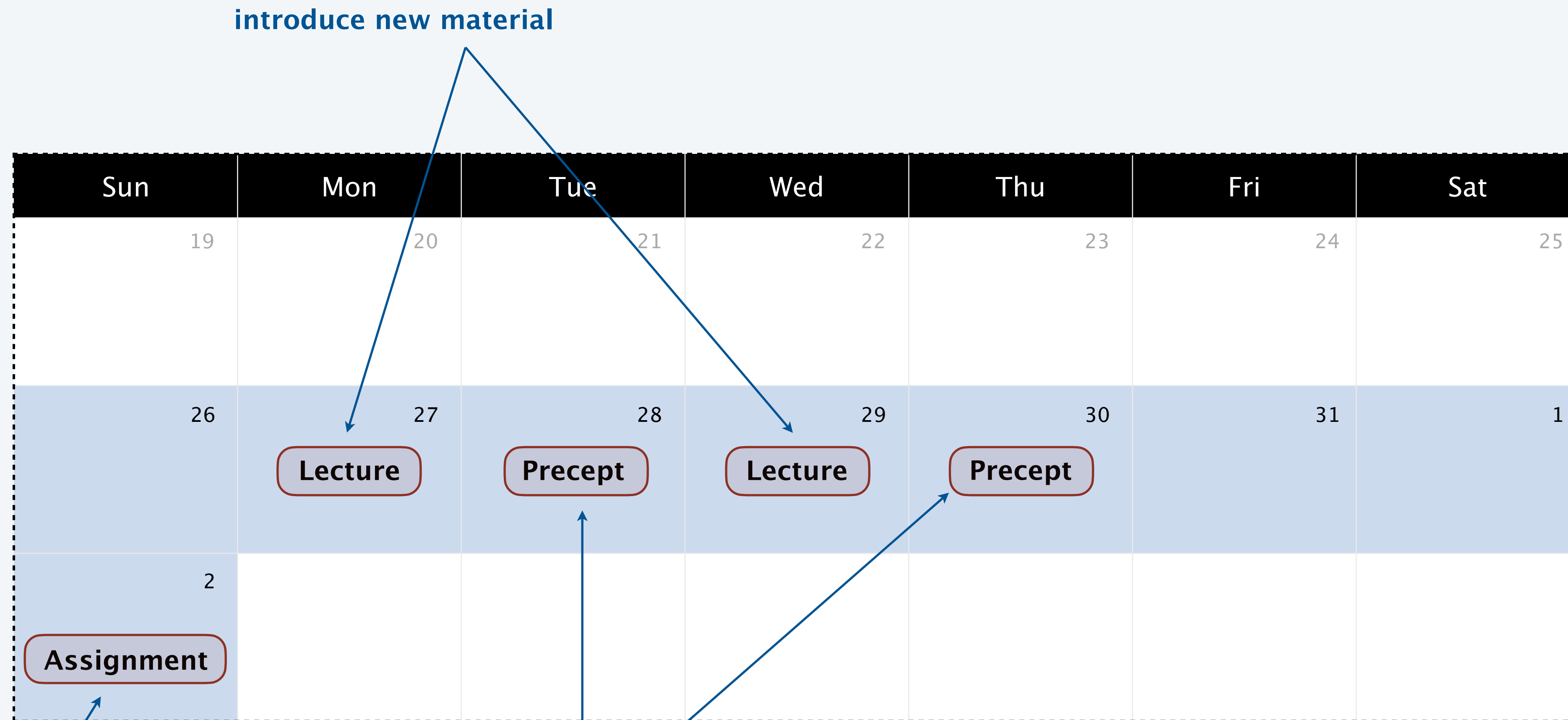
content based on week's material

support content in lecture

Precepts are either MW or TTh

Q&A

raise your hand and ask

or ask on Ed
(use ❤️ to upvote)

Credits

media	source	license
Crowd Cheering	YouTube	
Wireframe Tiger	Audrey Cheng '20	by author
Programmer	Wall Street Journal	
Albert Einstein	Wikimedia	public domain
Binary Tunnel	Adobe Stock	education license
Open Book with Letters	Adobe Stock	education license
Panda in Snow	Smithsonian National Zoo	public domain
DNA Sequencing	Adobe Stock	education license
3D Printer	Adobe Stock	education license
Fortran Punch Card	Wikimedia	CC BY-SA 2.5

Credits

media	source	license
Ocean Modeling	JPL / NASA	public domain
Fruit Fly Brain	FlyWire Brain	CC BY-NC 4.0
Pueblo Food Web	Stefani Crabtree	
Nuclear Physics	FLASH Center	
Colliding Galaxies	YouTube	
Airflow Over Landing Gear	NASA Ames Research Center	public domain
Coronavirus Simulation	New York Times	
McCosh 50	Figueras Seating	
Normal Distribution	Adobe Stock	education license
Handwritten Digit Demo	Adam Smith	
Stairway to Heaven	Led Zeppelin	

Credits

media	source	license
Collaborating Hands	Flaticon	Flaticon license
Cartoon People Sharing	Adobe Stock	education license
Light Bulb Idea	Clker-Free-Vector-Images	Pixabay
Ice Breaker	Adobe Stock	education license
Countdown Timer	YouTube	
Office Hours	clipground.com	CC BY 4.0
COS Lab TAs	Pulkit Singh '20	by author
McGraw Center	McGraw Center	
Student Raising Hand	classroomclipart.com	educational use
Question Marks	pikpng.com	non-commercial use