PLEASE TURN ON YOUR CAMERA
PLEASE UNMUTE AND MAKE SOME NOISE
PLEASE MUTE

QUIET PLEASE

RECORDING

SESSION IN PROGRESS
I will be recording our class sessions to ensure that they are available to students regardless of their geographic location and time zone. Please contact me if you wish to be edited out of any recording in which you appear.

Because of privacy, compliance, and legal considerations, you may not post recording of this class online or share them with anyone other than students enrolled in this course.
INTRO TO COS 226

- motivation
- course structure
- assessments
- resources

https://algs4.cs.princeton.edu
INTRO TO COS 226

› motivation
› course structure
› assessments
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COS 226 course overview

What is COS 226?
- Intermediate-level survey course.
- Programming and problem solving, with applications.
- **Data structure**: method for organizing data in a computer.

<table>
<thead>
<tr>
<th>topic</th>
<th>algorithms and data structures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>data types</strong></td>
<td>stack, queue, union–find</td>
</tr>
<tr>
<td><strong>sorting</strong></td>
<td>quicksort, mergesort, heapsort, priority queue</td>
</tr>
<tr>
<td><strong>searching</strong></td>
<td>BST, red–black BST, hash table, k-d tree</td>
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<tr>
<td><strong>graphs</strong></td>
<td>BFS, DFS, Prim, Kruskal, Dijkstra, Ford–Fulkerson</td>
</tr>
<tr>
<td><strong>strings</strong></td>
<td>radix sorts, tries, suffix arrays, data compression</td>
</tr>
</tbody>
</table>
Why study algorithms and data structures?

Their impact is broad and far-reaching.
Why study algorithms and data structures?

They may unlock the secrets of life and of the universe.

https://www.youtube.com/watch?v=ua7Yln4eL_w
Why study algorithms and data structures?

Old roots, new opportunities.

- Study of algorithms dates at least to Euclid.
- Named after Muḥammad ibn Mūsā al-Khwārizmī.
- Formalized by Church and Turing in 1930s.
- Some important algorithms were discovered by undergrads in a course like this!
I will, in fact, claim that the difference between a bad programmer and a good one is whether [they] consider [their] code or [their] data structures more important. Bad programmers worry about the code. Good programmers worry about data structures and their relationships.” — Linus Torvalds (architect of Linux and git)
Why study algorithms and data structures?

For intellectual stimulation.

“For me, great algorithms are the poetry of computation. Just like verse, they can be terse, allusive, dense, and even mysterious. But once unlocked, they cast a brilliant new light on some aspect of computing.” — Francis Sullivan
Why study algorithms and data structures?

For fun and profit.
Why study algorithms and data structures?

- Their impact is broad and far-reaching.
- They may unlock the secrets of life and of the universe.
- Old roots, new opportunities.
- To become a proficient programmer.
- For intellectual stimulation.
- For fun and profit.

Why study anything else?
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course format subject to change
(but will remain 100% remote)
Lectures

Live lectures. Introduce new material.

<table>
<thead>
<tr>
<th>What</th>
<th>When</th>
<th>Where</th>
<th>Who</th>
<th>Office Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>L01</td>
<td>TTh 11–12:20pm</td>
<td>Zoom</td>
<td>Kevin Wayne</td>
<td>see web</td>
</tr>
</tbody>
</table>

Attendance. Required. can be waived if living in a distant time zone

Zoom links. Available via Canvas.

Zoom recordings. Available via Canvas.

Live questions during lecture. Raise hand and unmute.

Side channel for questions during lecture. Ed Discussion.

Live questions after lecture. Stay in Zoom.
Student response system (required).

- Multiple choice questions to increase engagement.
- Register iClicker Reef using your Princeton email address.

Which iClicker are you using?

A. Web app.
B. iPhone app.
C. Android app.
D. Hardware.
Problem-solving, discussion, assignment prep, ...
# Precepts

<table>
<thead>
<tr>
<th>What</th>
<th>When</th>
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<th>Office Hours</th>
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<tbody>
<tr>
<td>P01</td>
<td>Th 3–4:20pm</td>
<td></td>
<td>Dan Leyzberg</td>
<td>see web</td>
</tr>
<tr>
<td>P02</td>
<td>Th 4:30–5:50pm</td>
<td></td>
<td>Victor Ongkowijaya</td>
<td>see web</td>
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<tr>
<td>P03</td>
<td>F 11–12:20pm</td>
<td></td>
<td>Qingchen Dang</td>
<td>see web</td>
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<tr>
<td>P04</td>
<td>F 11–12:20pm</td>
<td></td>
<td>Maia Ginsburg</td>
<td>see web</td>
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<tr>
<td>P05</td>
<td>F 1:30–2:50pm</td>
<td></td>
<td>Lahav Lipson</td>
<td>see web</td>
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<tr>
<td>P06</td>
<td>F 1:30–2:50pm</td>
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<td>Akash Gaonkar</td>
<td>see web</td>
</tr>
<tr>
<td>P07</td>
<td>F 3–4:20pm</td>
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<td>Danqi Liao</td>
<td>see web</td>
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<tr>
<td>P08</td>
<td>F 3–4:20pm</td>
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<td>Dan Leyzberg</td>
<td>see web</td>
</tr>
<tr>
<td>P10</td>
<td>Th 7:30–8:50pm</td>
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<td>Chloe Qiu</td>
<td>see web</td>
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</table>
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- union-find

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Programming assignments

Implement an efficient algorithm or data structure:

- DEQUES
- KD-TREES
- WORDNET
- BURROWS WHEELER

Solve an interesting application using a “textbook” algorithm:

- PERCOLATION
- AUTOCOMPLETE ME
- 8 PUZZLE
- SEAM CARVING

Pair programming (via Zoom) encouraged on designated assignments.
Recommended IDE. Custom Intellij 2020.1 environment.

- Embedded Bash terminal.
- Autoformat, autoimport, autocomplete, ....
- Continuous code inspection; integrated Checkstyle and SpotBugs.
- ...

upgrade to Fall 2020 version
Quizzes

Quizzera platform.

- 2–3 short questions per lecture.
- Solve using pencil and paper.
- 3 attempts per question (score = max of each question).

![Quizzera screenshot](image-url)
Midterm and final

Written exams.

- Questions drawn from lectures, precepts, and quizzes.
- Emphasizes non-programming material.
Grading  A+

Programming assignments.  45%
• Due at 11:59pm on Mondays via TigerFile.
• Collaboration/lateness policies: see web.

Quizzes.  10%
• Due at 11:59pm on Fridays via Quizzera.
• Collaboration/lateness policies: see web.

Exams.  15% + 25%
• 90-minute midterm on Monday, March 22.  24-hour window
• 3-hour final, as scheduled by Registrar.

Active participation.  5%
• Answer questions in online discussion forum.
• Participate in precept/lecture.
  [ perfect attendance not required to earn 100% of participation points ]
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Resources (textbook)


Available from various vendors and formats.

• Amazon: $85 hardcover, $55 Kindle, ...
• Labyrinth: $65 hardcover, $40 rent.
• Safari Tech Books Online, $0.
Resources (studio-produced videos)

Studio-produced videos (optional).

- Different perspective.
Resources (studio-produced videos)

Studio-produced videos (optional).

- Different perspective.
- Transcript search.

https://cuvids.io/app/course/2
Resources (web)

Course content.
- Course info.
- Lecture slides.
- Programming assignments.
- Quizzes.
- Exam archive.

Booksite.
- Brief summary of content.
- Download code from book.
- APIs and Javadoc.

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Resources (people)

Online discussion forum.
- Low latency, low bandwidth.
- See Ed Discussion for guidelines.
- Use Ed; do not email course staff.

Office hours.
- High bandwidth, high latency.
- See web for schedule.

“Computing laboratory.”
- Undergrad lab TAs.
- For help with debugging.
- See web for schedule.
<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
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- **Lecture 1** (Union–Find)  
- **Lecture 2** (Analysis)  
- **Precept 1**  
- **Quiz 0, 1, 2**  
- **Assignment 1** (Percolation)

You are here again on Thursday.

Content based on week's material.

Support lecture material; assignment prep.

Content based on corresponding lectures.
Administrative Q+A

Not registered? Register ASAP; attend any precept this week (Zoom links in Canvas).

Change precept? Use TigerHub.

All non-conflicting precepts closed? Contact Colleen Kenny.

Haven't taken COS 126? See COS placement officer.

Placed out of COS 126? Review Sections 1.1–1.2 of Algorithms 4/e.

Additional administrative questions. Ask now in Zoom; ask anytime in Ed Discussion.