I will be recording lectures and make them available in Canvas.

Because of privacy, compliance, and legal considerations, you may not record or redistribute recordings of this class.
INTRO TO COS 226

- motivation
- course structure
- assessments
- resources

https://algs4.cs.princeton.edu
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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>insertion sort, quicksort, mergesort, priority queue</td>
</tr>
<tr>
<td><strong>searching</strong></td>
<td>BST, red–black tree, hash table, k-d tree</td>
</tr>
<tr>
<td><strong>graphs</strong></td>
<td>BFS, DFS, Prim, Kruskal, Dijkstra</td>
</tr>
<tr>
<td><strong>advanced</strong></td>
<td>randomness, multiplicative weights, intractability</td>
</tr>
</tbody>
</table>

new this semester
Why study algorithms and data structures?

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

To become a proficient programmer.

“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.
- To become a proficient programmer.
- For intellectual stimulation.
- For fun and profit.

Why study anything else?
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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>Friend 101</td>
<td>Kevin Wayne</td>
<td>see web</td>
</tr>
</tbody>
</table>

**Questions.** Raise your hand and ask a question.  
**Electronic devices.** Permitted *only* to support lecture.  

← carpe diem!  

← viewing slides, taking notes, iClickers, …
iClicker (required). To earn participation credit:

- Create iClicker Cloud account using Princeton email.  
- Answer multiple choice questions during lecture.

Which iClicker device are you using?

A. Web
B. iPhone
C. Android
Precepts

Active learning. Problem-solving, discussion, assignment prep, ...

Turing precept P08. F 11-12:20pm.
- Intended for students seeking a more advanced treatment of material.
- Covers topics beyond scope of the course.
- Transfer in/out in TigerHub.

Prof. Pedro Paredes
Prof. Marcel Dall’Agnoll
Nataliia K.
Dongsheng Yang
Sabhya Chhabria
Wei Luo
Malinda Huang
Shelley Xia

Prof. Bob Tarjan (Turing award ’86)
INTRO TO COS 226

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- union–find

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Programming assignments

Implement an efficient algorithm or data structure:

- DEQUES
- KD-TREES
- WORDNET
- TBA

Solve an interesting application using a “textbook” algorithm:

- PERCOLATION
- AUTOCOMPLETE ME
- SEAM CARVING

Pair programming encouraged on designated assignments.
Programming environment

Recommended IDE. Custom IntelliJ 2023.2 environment. upgrade to Fall 2023 version

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

Quizzera platform.

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

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

COS 226 MIDTERM, SPRING 2023

3. Data structures. (6 points)

(a) Consider the following parent-link representation of a weighted quick union (link-by-size) data structure.

```
parent[] = [4 5 4 5 ? 5 2 5 8 5]
```

Which of the following values could be `parent[4]`?

Fill in all checkboxes that apply.

- [ ] 0
- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] 6
- [ ] 7
- [ ] 8
- [ ] 9
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%
- 80–minute midterm on Tuesday, October 10.
- 3–hour final, as scheduled by Registrar.

Active participation.  5%
- iClicker participation in lecture.
- Collaborative participation in precept.
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https://algs4.cs.princeton.edu
Resources (textbook)


Resources (web)

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

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

https://www.princeton.edu/~cos226

https://algs4.cs.princeton.edu
Resources (people)

Online discussion forum.
- Low latency, low bandwidth.
- Designate post as private only when necessary.
- See Ed FAQ for guidelines.

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

Intro COS lab.
- Undergrad lab TAs.
- For help with debugging.
- See web for schedule.
## Resources (ed tech)

<table>
<thead>
<tr>
<th>Platform</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>ed</td>
<td>discussion forum, precept lessons</td>
</tr>
<tr>
<td>IntelliJ</td>
<td>Java IDE</td>
</tr>
<tr>
<td>Quizzera</td>
<td>quizzes</td>
</tr>
<tr>
<td>TigerFile</td>
<td>assignment submissions</td>
</tr>
<tr>
<td>codePost</td>
<td>assignment feedback</td>
</tr>
<tr>
<td>Gradescope</td>
<td>exam feedback</td>
</tr>
<tr>
<td>Canvas</td>
<td>grades, lecture recordings</td>
</tr>
<tr>
<td>iClicker</td>
<td>in-class polls</td>
</tr>
<tr>
<td>CUbits</td>
<td>studio-produced videos</td>
</tr>
</tbody>
</table>

*also use for communication with course staff*
### A typical week (including this one!)

#### Lecture 1
- (Union–Find)

#### Lecture 2
- (Analysis)

#### Precept 1

#### Quiz 0, 1, 2

#### Assignment 1
- (Percolation)

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
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<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

- **content based on week's material**
- **content based on corresponding lectures**
- **again on Thursday**
- **support lecture material; assignment prep**

**you are here!**
Not registered? Register today.

Change precept? Use TigerHub.

All non-conflicting precepts closed? Contact our course admin, Sue Giranda.

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, after class, or any time in Ed Discussion.
Have you met the person sitting next to you?

A. Yes.
B. No.