

Data Structures

Introduction

CS 225

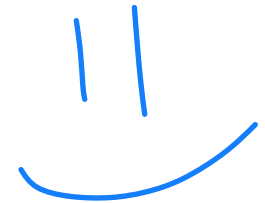
August 25, 2025

Brad Solomon



UNIVERSITY OF
ILLINOIS
URBANA - CHAMPAIGN

Department of Computer Science



Learning Objectives

Get to know course staff

Introduce this year's Honors Course

An overview of course expectations, goals, and structure



Who am I?



Brad Solomon (He/him/his)



Teaching Assistant Professor, Computer Science

2233 Siebel Center for Computer Science

Email: bradsol@illinois.edu

Hobbies: Board games, video games,
tabletop RPGs

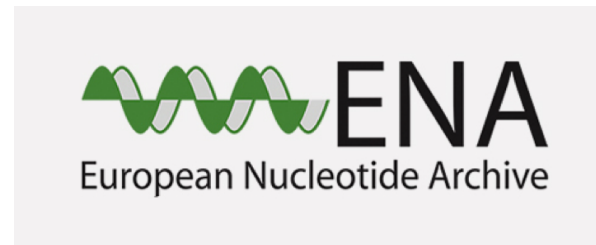
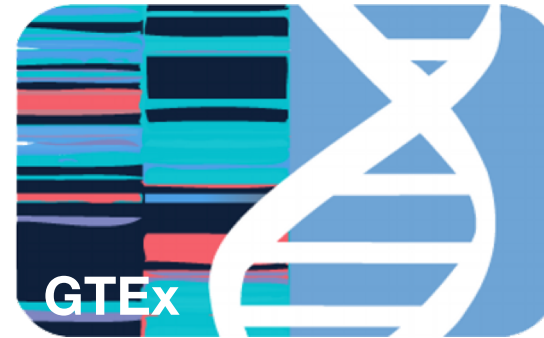
Research Areas: CS Education,
Computational Biology, Data Structures



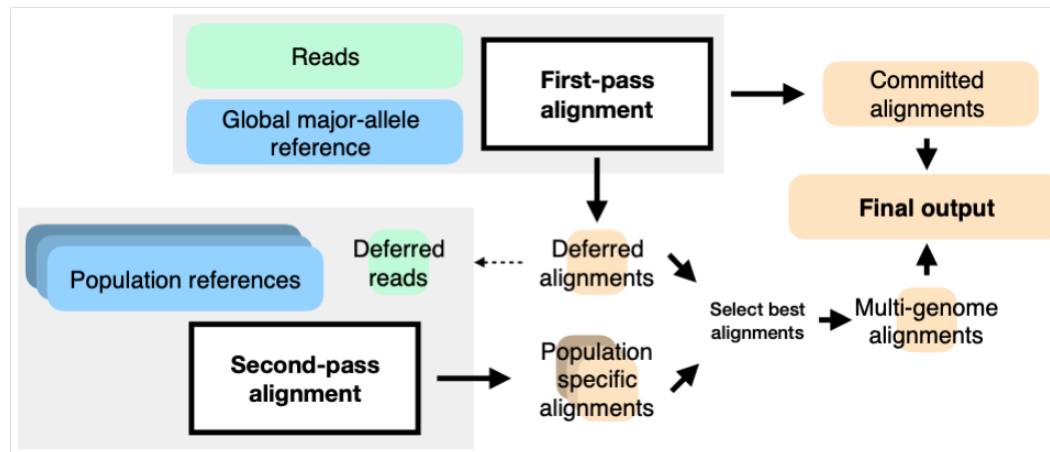
Brad Solomon



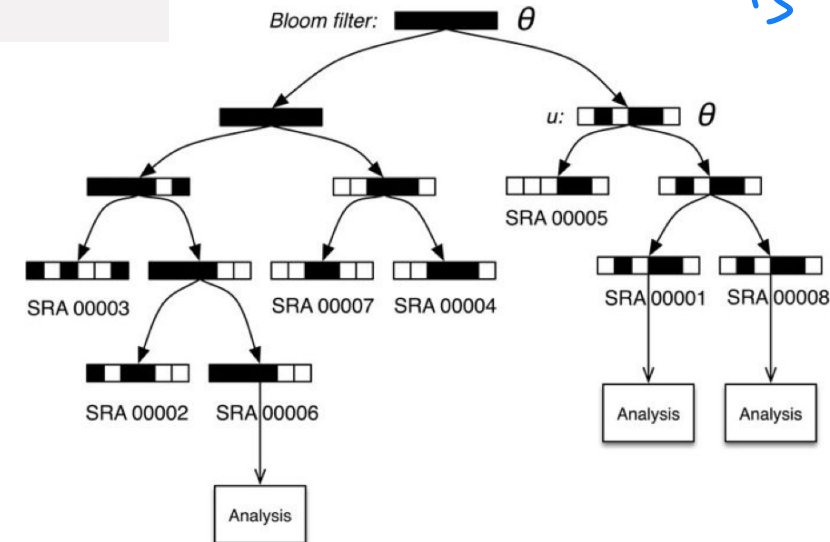
Strings →



Alg



Data Structures



Fast search of thousands of short read sequencing experiments. Brad Solomon and Carl Kingsford. *Nature Biotech* 2016.

Reducing reference bias using multiple population reference genomes. Chen et al. *Genome Biology* 2021

Me!

Name Mattox Beckman

History PhD, Fall 2003, University of Illinois at Urbana-Champaign
Lecturer 2003–2015 Illinois Institute of Technology

Research Areas CS Education, Programming Languages, Mathematical Foundations of Computer Science

Specialty Partial Evaluation, Functional Programming

Professional Interests Teaching; Computer Science Education; Functional Programming; Semantics and Types; Category Theory

Personal Interests Irish Music; Cooking; Go (Baduk, Wei-Qi, Igo); Philosophy; Evolution; Meditation; Kerbal Space Program; Home-brewing; ... and many many more ...

Harsha Srimath Tirumala

(He/him/his)

Hometown: Hyderabad, India

Graduate School: Rutgers University
(NJ)

Interests: Soccer, Tennis, Chess (none of which I am good at)

Favourite part of my job: **Students!**

Fun Fact: I have a twin brother



Orienting Questions

- Is it possible to sort n integers in $O(n \log n)$ time? (Ans - Yes & No)
- How efficiently can we search through n elements?
- What is information theory? (And why are we discussing it in a Data Structures course??)
- Analysis techniques and more ...

CS 199-225 Honors Section

- Topic - Advanced Data Structures
- Focus : Analysis of complexity, Structural limits
- Lower bounds for fundamental problems like sorting
- A few additional data structures to be discussed (time permitting)
- Assignments will be theoretical and involve analysis, proofs

Enrolling in CS 199-225

James Scholar Enrollment:

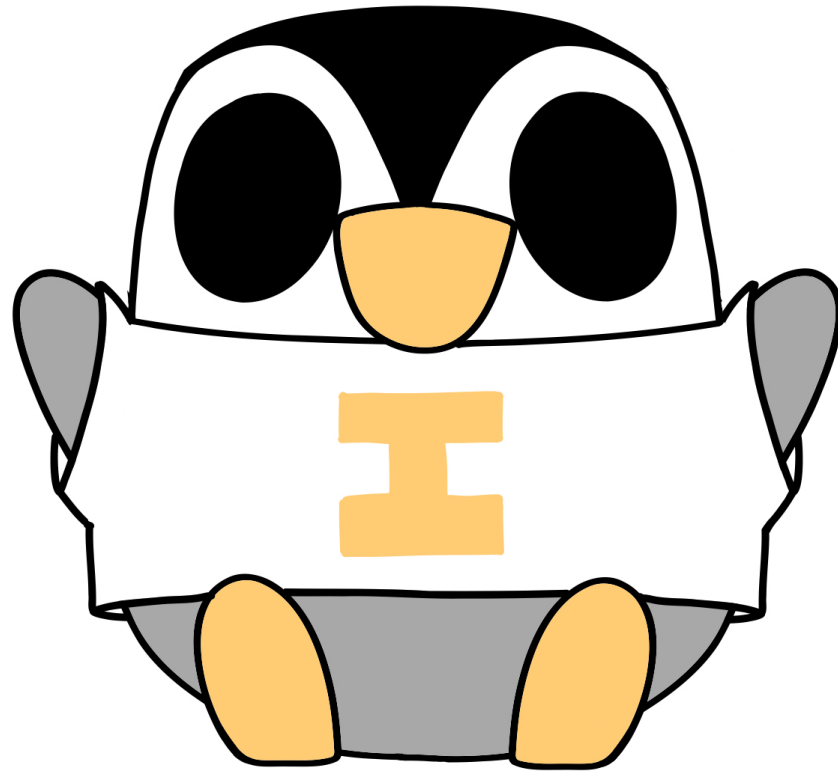
1. Register for CS 225 section AH (CRN 75824)
2. Fill out the appropriate Honors Credit Learning Agreement

Check your individual college for James Scholar deadlines

Standard Enrollment:

1. Register for CS 199-225 (CRN 40944)

This is a pass-fail grade and a 0-credit course



CS225 STAFF



How to contact us?

Admin Email: cs225admin@lists.cs.illinois.edu

For best results, give a descriptive subject header!

It may take a day or two to get a response.

Discord: <https://discord.gg/YuEwhnR>

Don't DM course staff on Discord

Be respectful to one another online

Use Discord in class to ask questions!

Everything about CS 225

<https://courses.engr.illinois.edu/cs225/>

Information on:

Staff

Communications

Lab Sections

MPs

Exams

Grading

Academic Integrity



A surprise pop quiz!

I missed the Discord link. Where can I find it?

When is exam 0? What is on it?

Exam 0 (9/3 — 9/5)

An introduction to CBTF exam environment / expectations

Quiz on foundational knowledge from all pre-reqs

Practice questions can be found on PL

Topics covered can be found on website

Registration started August 21

Grading — Point Distribution

Category	Contribution	Notes
Machine Problems	300	50 points each
Lab Assignments	120	10 points each
Exams	420	70 points each
Final Exam	160	

All MPs have a one-day late policy for 93% credit



There are no built-in extensions for labs

Grading — Final Grades

Points [930, ∞)*	Grade A+	Points [930, ∞)*	Grade A	Points [900, 930)	Grade A-
[870, 900)	B+	[830, 870)	B	[800, 830)	B-
[770, 800)	C+	[730, 770)	C	[700, 730)	C-
[670, 700)	D+	[630, 670)	D	[600, 630)	D-
		(600, 0]	F		

* An A+ requires both a minimum amount of points and the support of one or more course staff members who have found some part of your work exceptional.

Extra Credit Opportunities

MP Extra Credit Submission (20 pts)

4 points per MP (first MP no early submission)

Problems of the day (30 pts)

1 point per PoTD

Course Feedback Surveys (16 pts)

2 points per survey; 4 points for Informal Early Feedback

Extra credit is capped at 66 points.

Extra Credit Opportunities

New this semester: Exam retake opportunity

See website for details (retake is last week of class)!

Final grade will be the average of original and retake

This can result in lowering your final grade!

Extension Policy

Every MP has a built-in 24-hour extension for 93% credit

Every student gets one free extension on any assignment!

Free extensions are 48 hours from **original deadline!**

To get your extension, fill out the [extension request form](#).

For best results, request 48 hours ahead of deadline!



Plagiarism Policy

Don't share your code with anyone! Ever!

Don't use or look up code solutions from any source!

Don't use generative AI tools!

Infractions will result in 0s on the assignment, 100 point loss in class, and a loss of all extra credit*

All infractions will be reported through FAIR and remain on your permanent record.

Statement on Mental Health

This class has a relatively high workload. If you are struggling...

Consider reaching out to course staff!



Come to any faculty member's OH (email to schedule a one-on-one)

Take advantage of extension request forms!

UIUC offers a variety of confidential services:

Counseling Center: 217-333-3704

610 East John Street Champaign, IL 61820

McKinley Health Center: 217-333-2700

1109 South Lincoln Avenue, Urbana, Illinois 61801



Diversity, Equity, and Inclusion

“If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of...”

Course CAs

Faculty

Campus Belonging Office ([Link](#))

The Office of Student Conflict Resolution ([Link](#))

CS CARES ([Link](#))

Questions about course policy / structure?



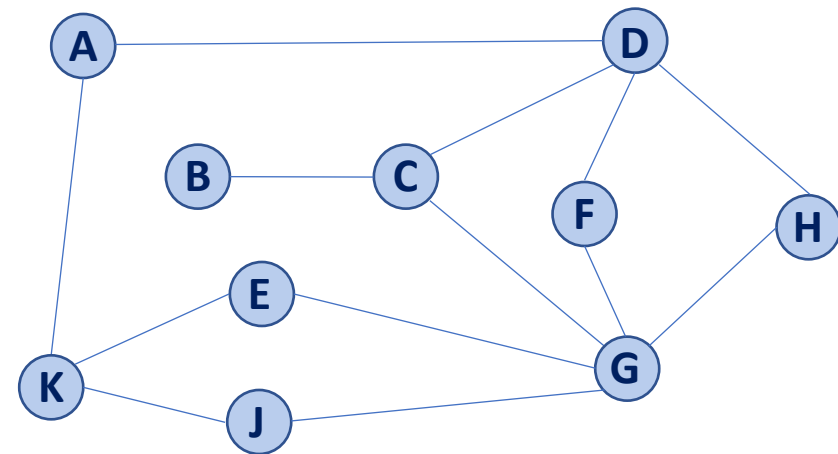
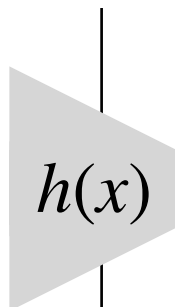
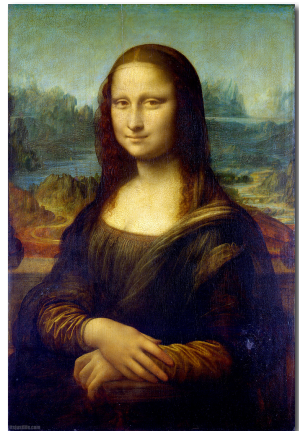
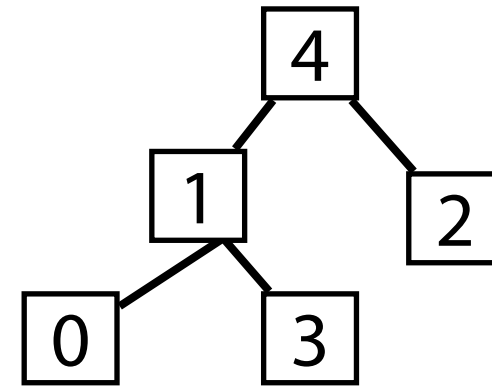
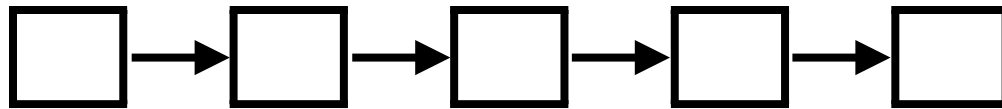


What is this course about?



CS 225 — Course Goals

Understand foundational data structures and algorithms

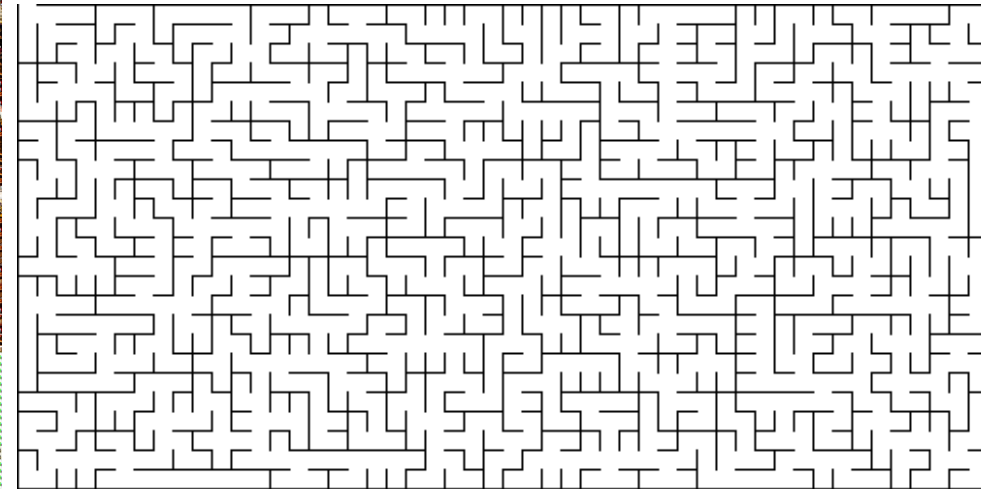
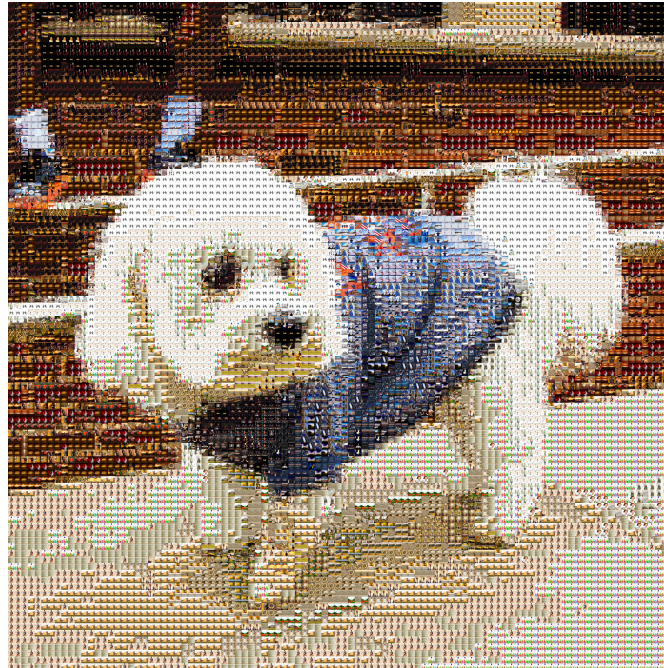
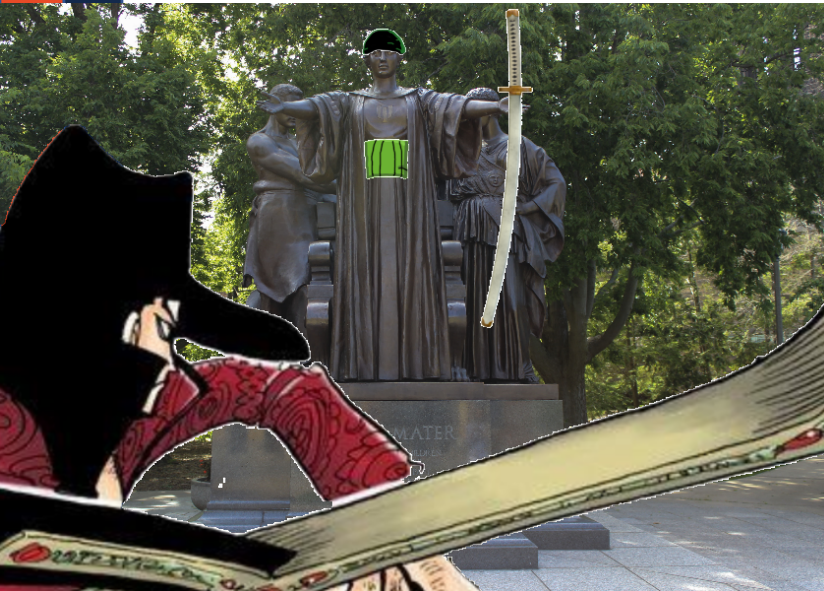


CS 225 — Course Goals

Justify appropriate algorithms for complex problems

Decompose problem into supporting data structures

↓ *Analyze efficiency of implementation choices*



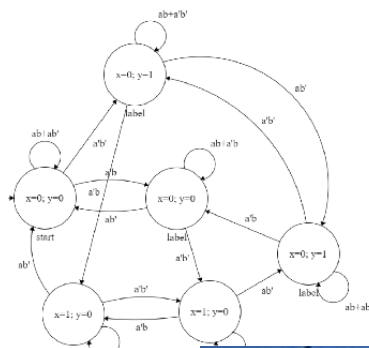
CS 225 — Course Goals

Implement intermediate difficulty problems in C++

```
/workspaces/cs225git/mp_stickers/tests/tests-part2.cpp:227: FAILED:
  REQUIRE( sheet.render() == alma )
with expansion:
  PNG(w=961, h=600, hash=103ac580ac38a31d)
  ==
  PNG(w=960, h=600, hash=103ac580ac38a31d)

AC-----
StickerSheet::getSticker() returns NULL for a removed sticker
-----
/workspaces/cs225git/mp_stickers/tests/tests-part2.cpp:255
-----

/workspaces/cs225git/mp_stickers/tests/tests-part2.cpp:256: FAILED:
due to a fatal error condition:
```



Submitted answer 1
Submitted at 2023-08-30 21:35:35 (CDT) invalid, not gradable show

✗ [0/5] A StickerSheet with no stickers works

✗ [0/5] StickerSheet does not duplicate stickers in memory

✗ [0/5] StickerSheet behaves correctly when a sticker is updated

Save & Grade Unlimited attempts

Save only

Grading possible in 238 min

Can only be graded once every 360 minutes

✗ [0/5] StickerSheet::setStickerAtLayer() fails for an invalid layer

✓ [10/10] myImage.png exists and contains stickers

CS 225 — Course Goals

Understand foundational data structures and algorithms

Justify appropriate algorithms for complex problems

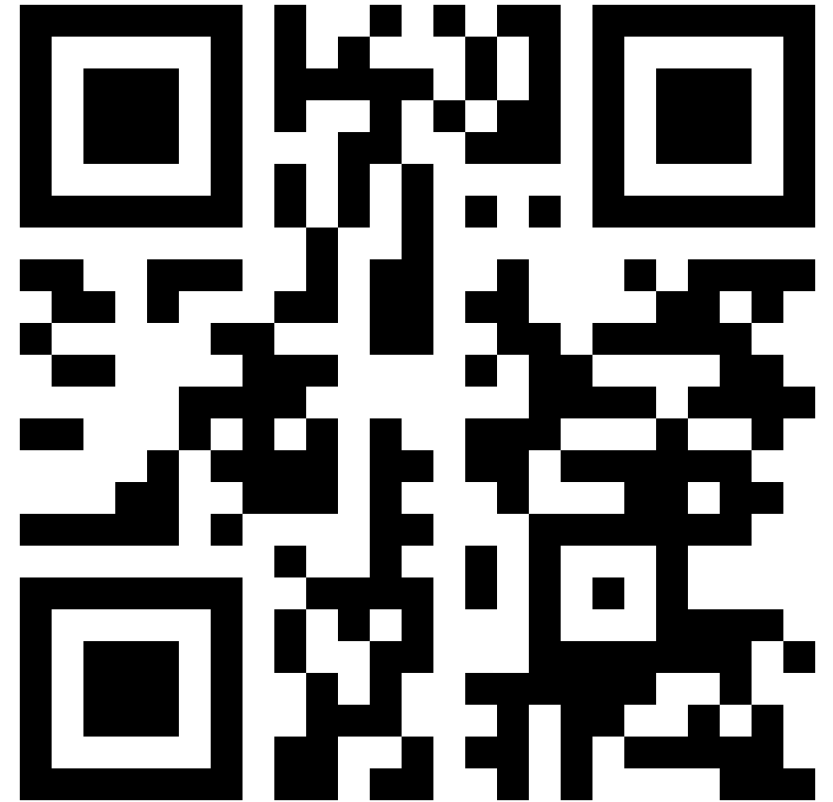
Implement intermediate difficulty problems in C++

Improve your foundation of CS theory

Surprise Survey!

On a scale of 1—5, how confident are you in your coding skills?

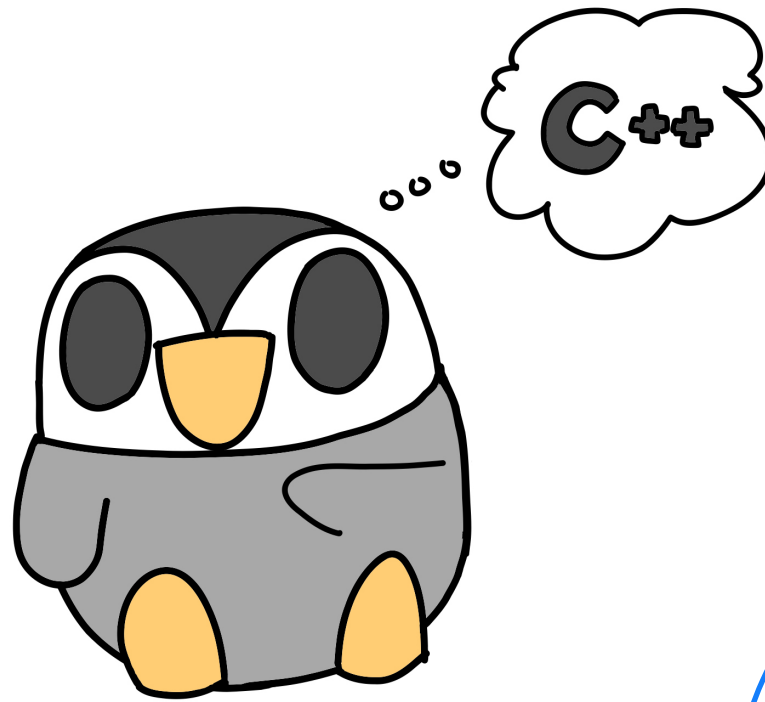
- 1) Not at all confident
- 2) Slightly confident
- 3) Somewhat confident
- 4) Confident
- 5) Very confident



Respond at <https://clicker.cs.illinois.edu/>

Join Code: 225

What about C++



Wednesday

Lectures from Previous Semesters Covering C++ Available Here

https://mediaspace.illinois.edu/playlist/dedicated/177553201/1_s10ctiib/1_z2cz05fi

(Optional) Open Lab This Week

This week's lab is open office hours

Focus is making sure your machine is setup for semester

Installation information available on website

