CSE 331: Algorithms & Complexity

"Introductions"

Prof. Charlie Anne Carlson (She/Her)

Lecture 0

Monday August 25th, 2025

University at Buffalo®

Introduction: Me

- ~~Prof.~~ **Charlie (Anne)** ~~Carlson~~**:**
- Algorithmist, Computologist, and Theoretical Computer Scientist
- Former Engineer at Microsoft
- From Rural Alaska
- New Assistant Professor
- Hobbies: Books, Video Games, Baking, Other Nerdy Things…

UAF → Microsoft → UIUC → CU Boulder → UCSB → **University at Buffalo**

Introduction: TAs

- Harshini Subbiah
- John Nguyen
- Tien Minh Tran
- **Andrew Brigman**
- Nirav Kanadia
- Lindsey Xiao
- Laibah Ahmed
- Shambhavi Goyal
- Daniel Lang
- **Sean Grzenda**
- **Alexander Gherardi**

Introduction: Contact Us

First Consider: Piazza!

Then Perhaps: cse-331-staff@buffalo.edu

Sometimes: cc387@buffalo.edu

Introduction: You

Questions?

Course Descriptions: Simplified

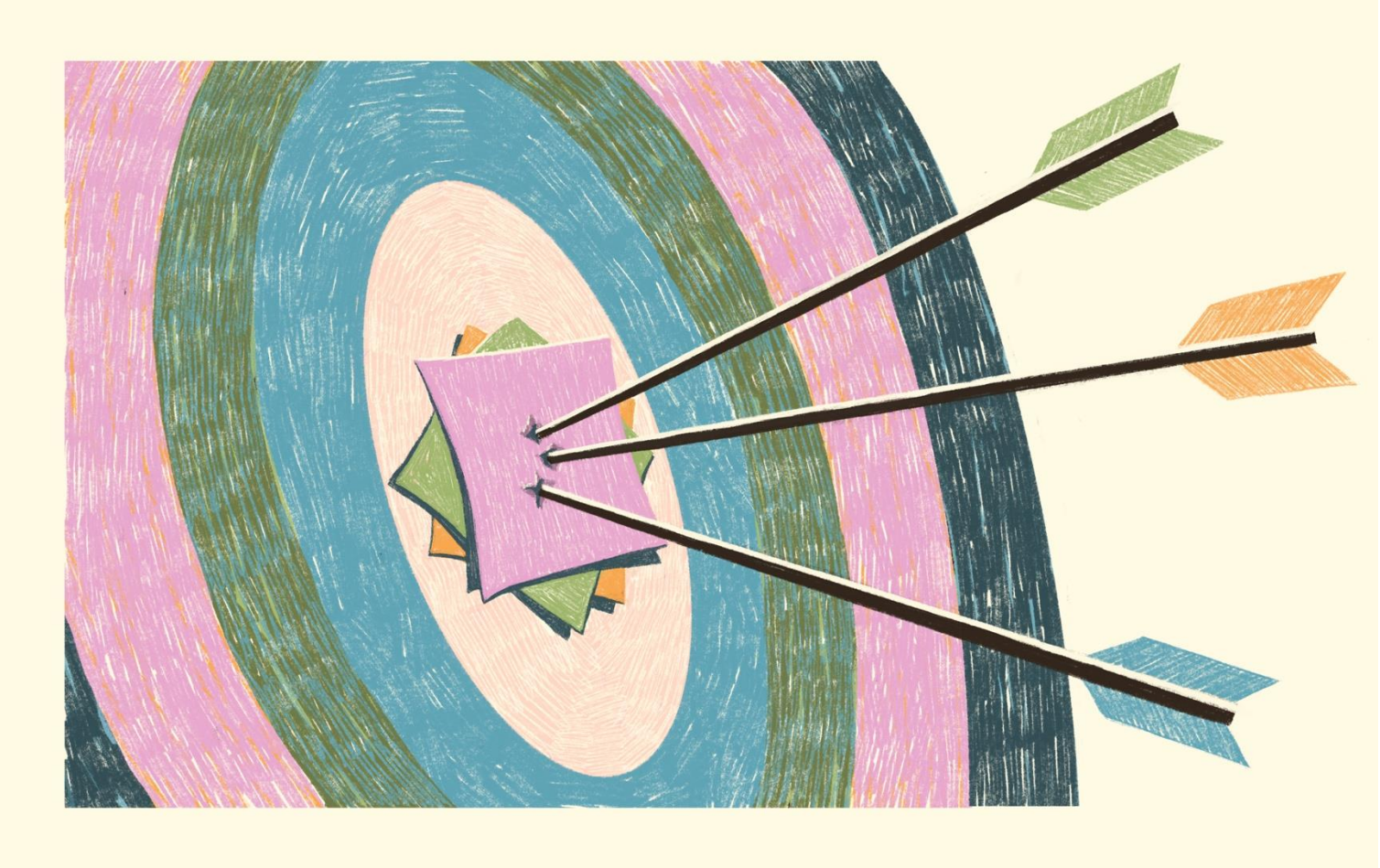
Idea: Introduces paradigms for designing algorithms and fundamental limitations to what algorithms can do.

Specific Algorithms Topics: greedy algorithms, divide and conquer algorithms, and dynamic programming.

Specific Complexity Topics: Topics related to limitations of algorithms include NP-completeness and undecidability.

Methods: Coverage includes analyzing algorithms via proofs and programming assignments to implement algorithms.

Course Descriptions: Goals



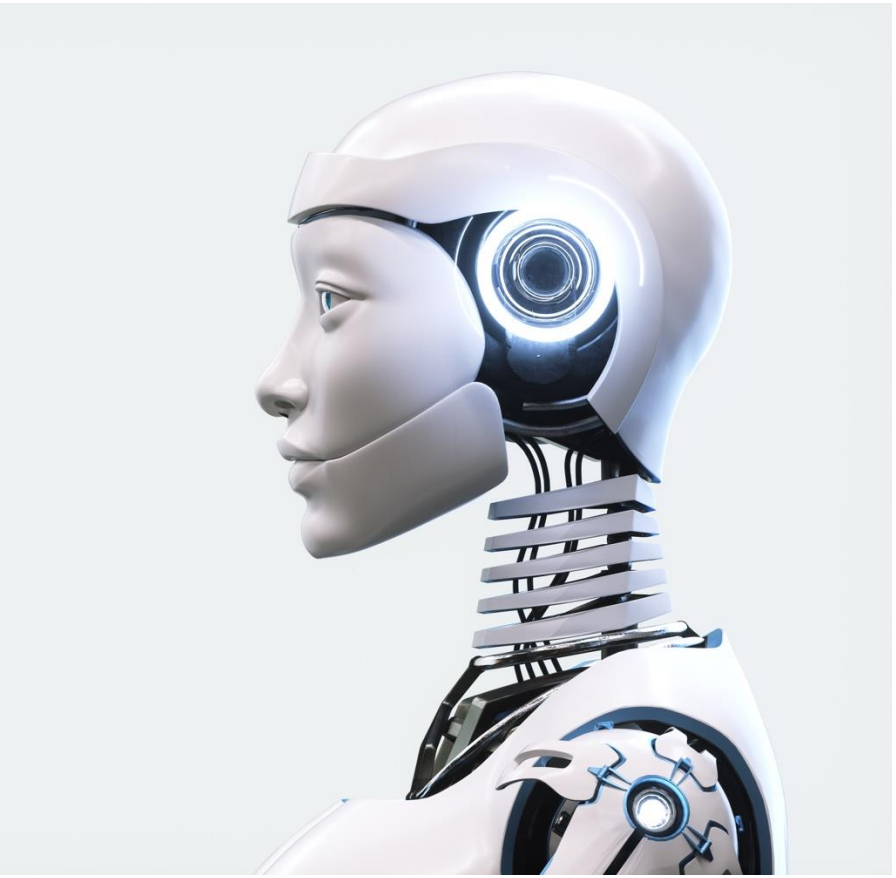
- Keep in mind what you want out of this class.
- Keep in mind what success means to you.
- Keep in mind that this course is not the end of your algorithm journey.

Motivations...

- Prepare for esoteric job interviews
- Become better programmers
- Become better mathematicians
- Prepare for advance topics
- Try something new and beautiful
- Watch me act silly...

I WANT A JOB!

Motivation: You vs Machine

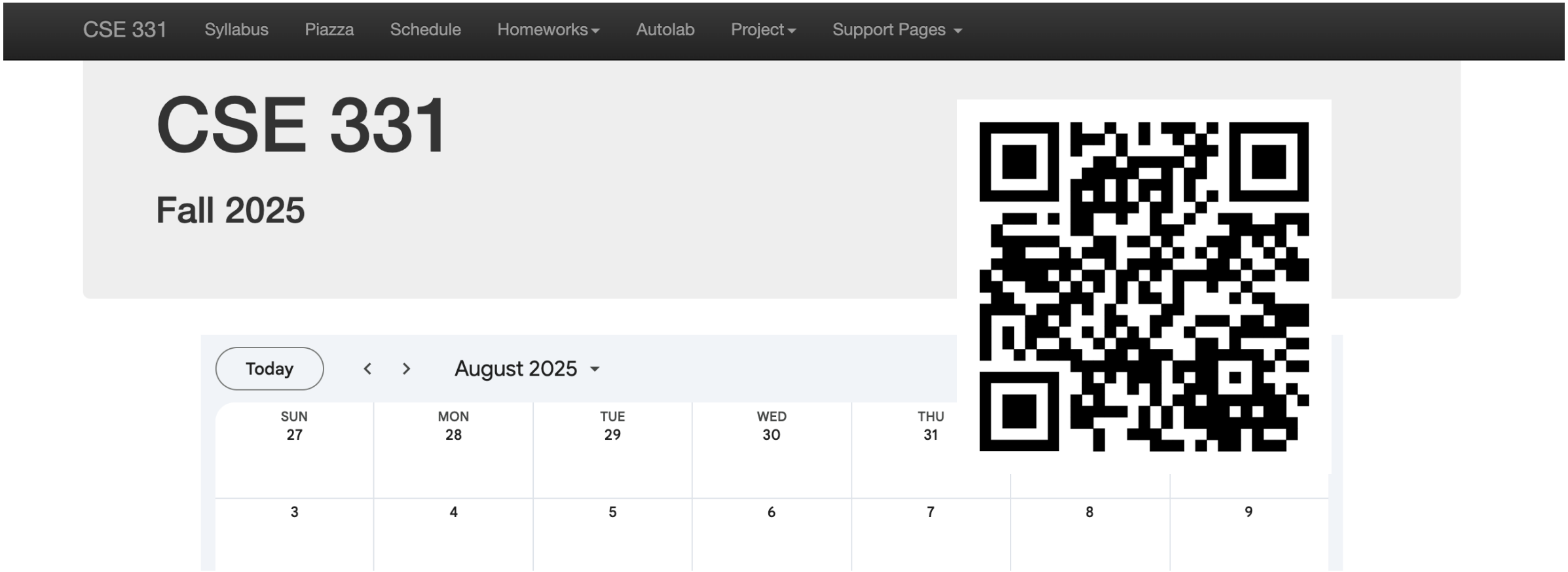


Proofs…

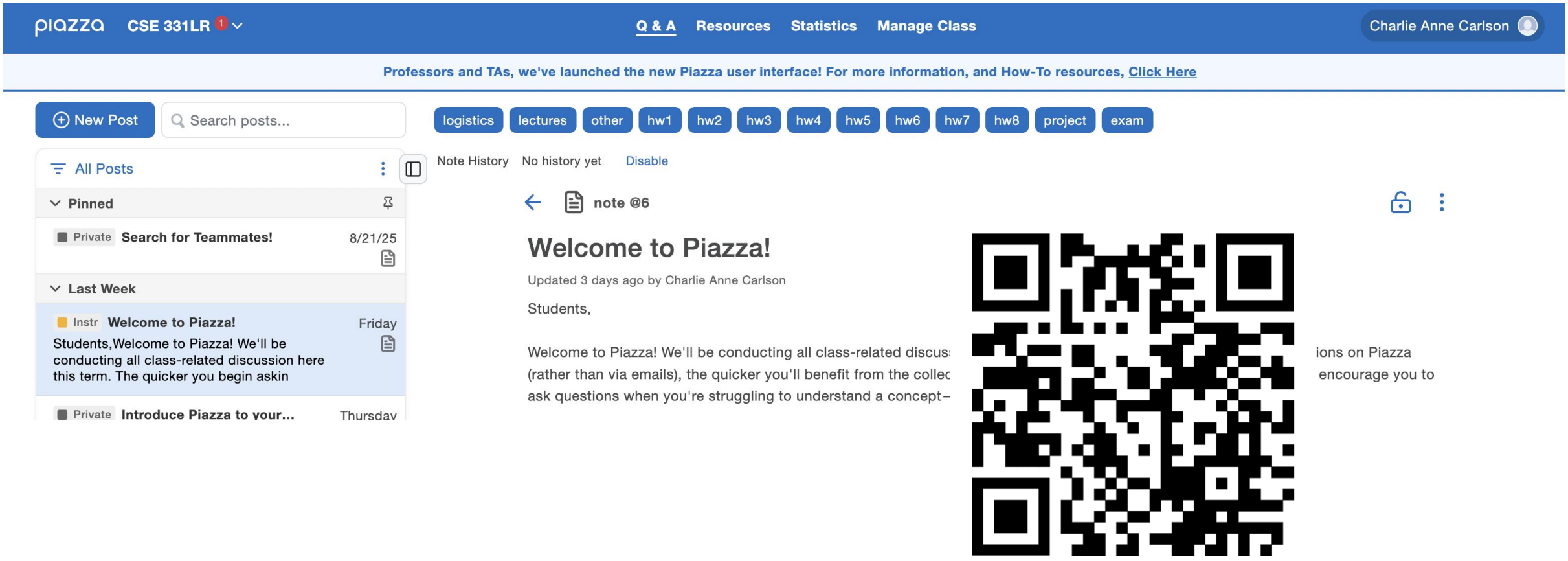
- This class is about formally proving algorithms work or don’t work.
- There will be proofs!
- Proof writing takes practice, patience, and perseverance.

Website

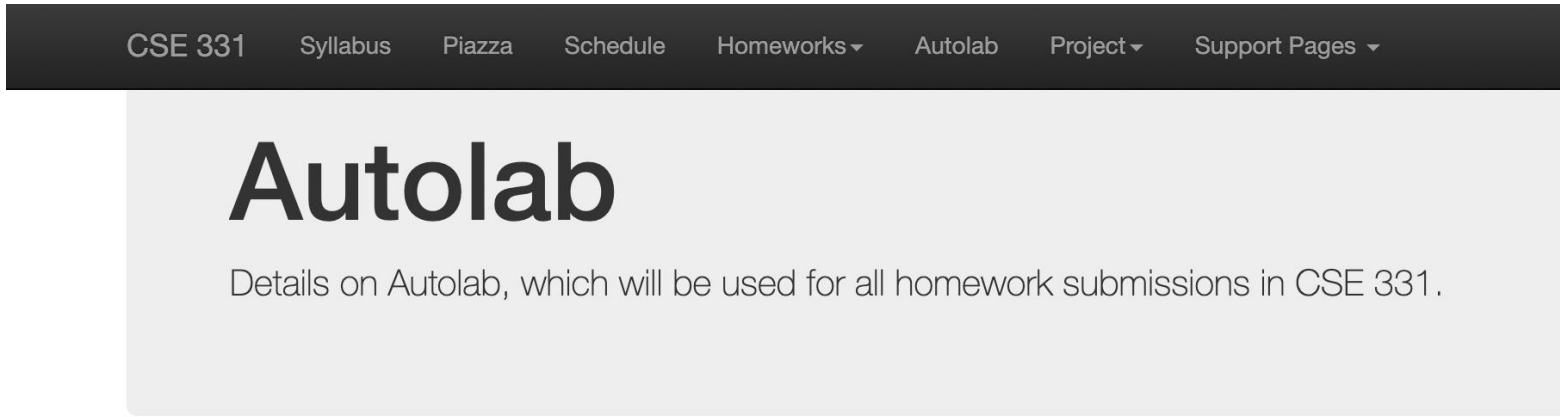
https://www.buffalo.edu/~cc387/CSE331/fall25/



Piazza


piazza
CSE 331LR
Q & A
Resources
Statistics
Manage Class
Charlie Anne Carlson
Professors and TAs, we've launched the new Piazza user interface! For more information, and How-To resources, Click Here
New Post
Search posts...
logistics
lectures
other
hw1
hw2
hw3
hw4
hw5
hw6
hw7
hw8
project
exam
All Posts
Note History
No history yet
Disable
Pinned
Private
Search for Teammates!
8/21/25
Last Week
Instr
Welcome to Piazza!
Friday
Students,Welcome to Piazza! We'll be conducting all class-related discussion here this term. The quicker you begin askin
Private
Introduce Piazza to your...
Thursday
note @6
Welcome to Piazza!
Updated 3 days ago by Charlie Anne Carlson
Students,
Welcome to Piazza! We'll be conducting all class-related discus
ions on Piazza
(rather than via emails), the quicker you'll benefit from the collec
encourage you to
ask questions when you're struggling to understand a concept–

Autolab



The main link

We will be using the UB CSE extension to Autolab for submission and (auto)grading of CSE 331 homeworks. You can access Autolab via https://autolab.cse.buffalo.edu/.

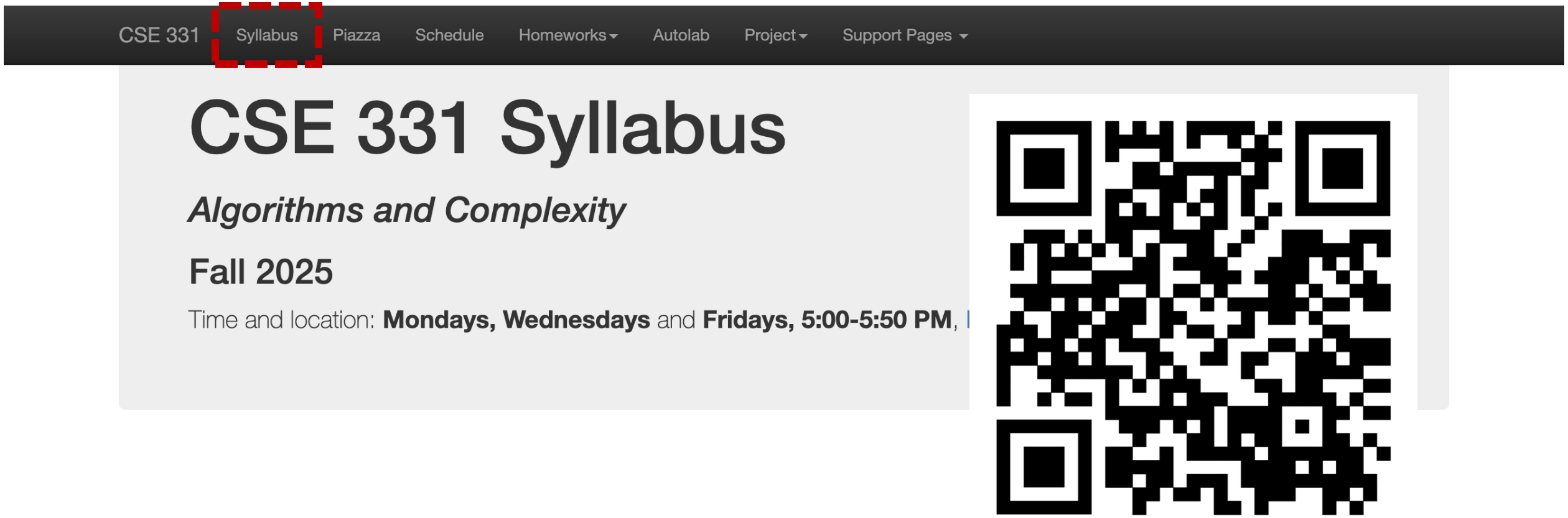
Signing up

Follow these steps to setup an account on Autolab (unless you already have one in which case you'll use your existing account):

1. Go to this page and click on the Sign in with MyUB link. If you do not already have an account, a new account will automatically be created for you (and you might have to fill in some details).
2. I believe Autolab should now be using your preferred name instead of your official UB first and last name. **If this is not the case, please let us know ASAP.**
3. We will have leader boards for all the programming assignments. For anonymity, all students are identified by their chosen nicknames. So please make sure you pick an appropriate one (you can change your nickname at any point in time).
4. After you have done the above steps, you wait.

Syllabus: Overview

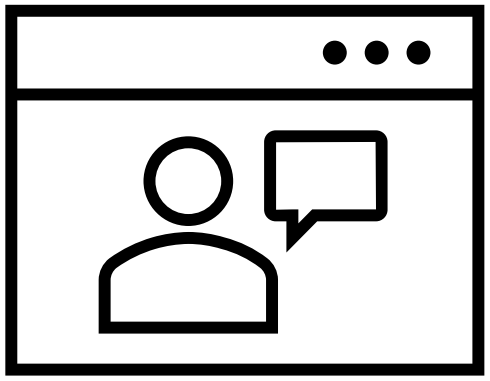
https://www.buffalo.edu/~cc387/CSE331/fall25/



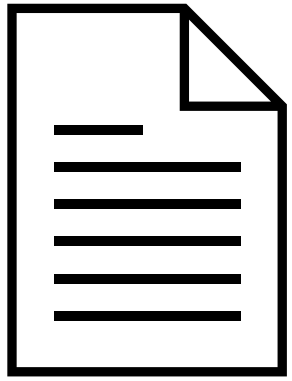
Syllabus: Syllabus Quiz

Acknowledgment

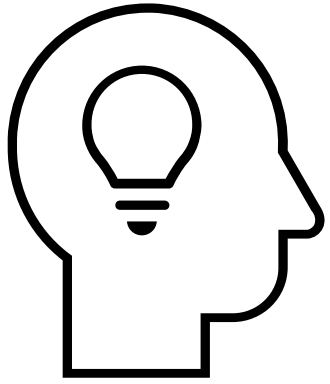
Once you have read the syllabus carefully, please fill in the Syllabus quiz on Autolab. As an incentive for you to fill in this form, **you will not receive any feedback on your assignments till you successfully answer AT LEAST 18 out of the 20 questions in the quiz**. (You can attempt the quiz as many times as you want.) Note that in addition to this syllabus, the quiz will also ask questions based on the homework policies.



Watch Syllabus Video



Read Syllabus



Think About Syllabus

Destroy Quiz!

Syllabus: Accessibility & Inclusion

University at Buffalo

Office of the Vice President for Student Life

Student Guide

Announcements | Events

Everything you need for life outside the classroom

Fall Opening | New to UB | Life on Campus | Skills for Success | Help/Support | ABOUT

Student Guide › Who We Are › Departments › Accessibility Resources

Accessibility Resources at UB

Accessibility Resources coordinates reasonable accommodations for equitable access to UB for students with disabilities.

Accessibility Resources

For Students

Syllabus: Academic Dishonesty

Academic Integrity

Penalty for academic integrity violation

In accordance with the current departmental policy on academic integrity violations, we will follow this procedure in CSE 331:

1. If the violation is the student's second academic violation, then it will result in an automatic `F` letter grade in the course.
2. If the violation is the first ever academic violation, then (except for the exception below) it will result in a **minimum** of a `letter grade reduction` in the course **and** `zero in the relevant assignment/exam`. If the violation is serious enough, then it can result in an `F in the course`. While it gives me no pleasure in failing students, I will do so since I have to be fair to (the vast majority of) students who do not cheat. Please read the homework policies to make sure you follow all the rules and do not violate academic integrity.
3. If the **violation involves the use of ChatGPT (or other generative AI tools)**, irrespective of whether it is the student's first violation or not, then it will result in an automatic `F` letter grade in the course.

Syllabus: Grading Breakdown

Grading Policy

Here is the split of grades:

Course Component	% of grade
Project	10%
Homeworks	27%
Quizzes	3%
Exams	60%

- There might be a curve, but you will fail if you get **below a 20%** and you will only get an A if you get **above a 90%**.
- I reserve the right to adopt additional grading policies that improve everyone's grade.

Syllabus: Grading Breakdown Homeworks

Quantity	%	Details	Due Date(s)
6 You will complete 8, but your two lowest-scoring homeworks will be dropped.	**27**	The homework will consist of one programming question (which can be submitted in C++, Java, or Python, and will be autograded by Autolab and two proof based questions	Assigned Tuesdays and Due Tuesdays

Homework 0 is just to give you feedback on your solutions; it will be graded but will not count towards your final grade.
No late submission will be accepted.

Graphic taken from Yorah Bosse's Slides

Syllabus: Grading Breakdown Project

2

Quantity	%	Details	Due Date(s)
1 There are five problems, each of which involves coding and reflection.	**10**	**Coding Component (4%):** programming tasks and work in group. **Reflection Component (1%):** group will reflect on ethical and societal considerations. **Individual Component (5%):** At the end of the project, you will rate your own and your other group member's contribution to the project.	Weeks **10**, **11**, **12**, **13**, and **14**

Graphic taken from Yorah Bosse's Slides

Syllabus: Grading Breakdown Quizzes

Quantity	%	Details	Due Date(s)
2 Both quizzes will be solved in class.	**3**	The quizzes will consist of one or two true/false (with justification) questions. Such questions will be on the exams. These quizzes will be an opportunity for you to try and solve such questions before the exams.	Weeks **7** and **15**

Graphic taken from Yorah Bosse's Slides

Syllabus: Grading Breakdown Exams

Quantity	%	Details	Due Date(s)
2	**60**	The **mid-term** is worth 25% of your grade and the **final exam** is worth 35% of your grade. *However, if it is to your advantage, then the final exam will be worth* 60% *of your grade*.	Weeks **8** and **16 or 17**

No makeup exams will be given except in *provably extreme circumstances*.

Read details on the syllabus.

Graphic taken from Yorah Bosse's Slides

Syllabus: Project

CSE 331 Syllabus Piazza Schedule Homeworks Autolab Project Support Pages

CSE 331 Project

Fall 2025

Details and motivations for the project.

Motivation

CSE 331 is primarily concerned with the technical aspects of algorithms: how to design them and then how to analyze their correctness and runtime. However, algorithms are pervasive in our world and are commonplace in many aspects of society. The main aim of the project is to have you explore some of the social implications of algorithms.

Just to give some examples for such implications:

Syllabus: Schedule

CSE 331 Syllabus Piazza Schedule Homeworks Autolab Project Support Pages

CSE 331 Fall 2025 Schedu

Previous schedules: 2024 (Spring) and 2024 (Fall).

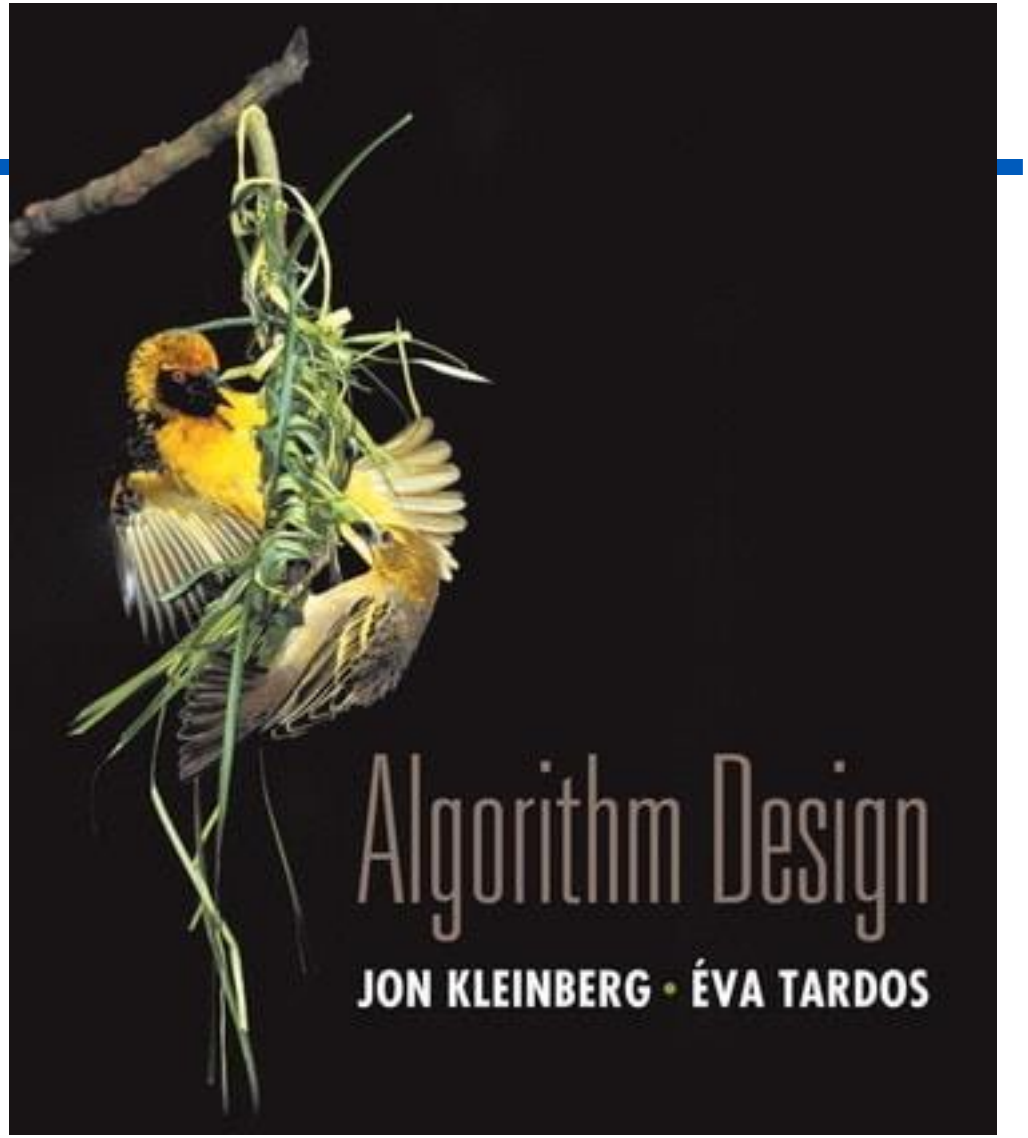
Future Lectures

The topics for lectures in the future are tentative and subject to change. Also the links for future lectures are from Fall 2024. Recordings of Fall 2025 lectures are also available from `UBLearns`.

Date	Topic (Slides & Videos)	Notes
Mon, Aug 25	Introduction F24	Syllabus Walkthrough:
Tue, Aug 28		**(HW 0 out)**
Wed, Aug 29	Let's do a proof! F24	Week 1 Recitation Notes

Syllabus: Textbook

1. Introduction [KT, Chap 1] (2 weeks).
2. Graph Basics [KT, Chap 3] (1.5 weeks).
3. Greedy Algorithms [KT, Chap 4] (2.5 weeks).
4. Divide and Conquer Algorithms [KT, Chap 5] (2 weeks).
5. Dynamic Programming [KT, Chap 6] (2.5 weeks).
6. NP-completeness [KT, Chap 8] and undecidability (2.5 weeks).



Syllabus: Recitations

- Start this week!
- Notes are available online.
- First week is going to be about **proofs**.
- Will often talk about homework problems or adjacent problems.
- Great place to ask questions, see **worked examples**, and practice being wrong.
- Recitations are not recorded.

Questions?