

**CS3000 - Algorithms & Data  
Summer 2025  
Northeastern University**

**Prof. Laney Strange (she/her)**

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Course web page	<a href="http://course.ccs.neu.edu/cs3000">http://course.ccs.neu.edu/cs3000</a>
Piazza	<a href="https://piazza.com/northeastern/summer2025/cs3000">https://piazza.com/northeastern/summer2025/cs3000</a>
Gradescope	<a href="https://www.gradescope.com/courses/1020809">https://www.gradescope.com/courses/1020809</a>
Lecture Schedule	MTWR 11:40am-1:20pm CH 103
Recitation Schedule (CS3001)	Official Recitation - Tuesday Sec 2. T 1:30-2:35pm HT 130 Sec 1. T 3:20-4:25pm RI 236  Fun-Algo Recitation - Thursday All sections. R 1:30-2:35pm HT 130

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# About this Course

This is an introductory undergraduate course in algorithms. Every computer program can be viewed as an implementation of an algorithm for solving a particular computational problem. The focus of this course is on learning algorithm design techniques for solving the underlying computational problems. We will also look at how algorithms translate to programs, but our emphasis will be on the algorithm design and analysis. In this class, we will:

- Work on a range of computational problems that arise in diverse applications
- Learn how to formulate problems precisely from somewhat informal descriptions
- Learn algorithmic design techniques used to solve the problems
- Learn proof techniques critical for reasoning about algorithms
- Learn analysis techniques critical to determine the efficiency of algorithms

Specific topics covered in the course include:

- Basics tools for analysis of algorithms: proof by induction, asymptotic notation
- Divide-and-conquer algorithms
- Dynamic programming
- Basic graph algorithms: BFS, DFS, topological sorting, strongly connected components
- Graph optimization: shortest paths, minimum spanning trees
- Amortized analysis, randomized algorithms
- Greedy algorithms
- Network flow algorithms and applications
- NP-completeness

# Recommended Textbook

There is no required textbook. However, the material is mostly going to be from the following book:

- [Introduction to Algorithms](#) by Cormen, Leiserson, Rivest, and Stein
- (The 4th edition it out, but it's fine to buy an older/used edition!)

Relevant chapters will be listed alongside lecture topics on the course website. You do not need to read the textbooks ahead of lecture; they are most useful as reference materials or for looking up new examples. Keep them handy when working on the homework or reviewing your lecture notes.

# Evaluation

Factor	Number	Weight
Homeworks	5	35%
Algorithm Practice Problems (APPs) 3 dropped	8	20%

Exams	2	45%
	<b>TOTAL</b>	<b>100%</b>

## Letter Grades

Your final grade for CS3000 will use the following breakpoints to convert from letter to number grades. We use natural rounding to get these whole numbers, e.g., 96.5 becomes a 97 but 96.4 becomes 96. All homeworks are equally weighted, regardless of the number of points allocated.

<b>Letter</b>	<b>Range</b>
A	94-100
A-	90-93
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D	60-69
F	< 60

## Office Hours

Office hours are a great place to get clarification on concepts and have conversations with TAs and professors. Instructor and TA office hours are listed on the course website.

It'll be important that you come to office hours having already made an attempt on the homework. We will be happy to help guide you on concepts and provide clarification. We do not provide you with answers to problems, and we do not confirm that your solution is correct.

# Inclusive Classroom

We believe that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to Laney to make alternative arrangements.

## Lecture Questions

We invite everyone to raise their hands to ask and answer questions during class, and to engage in discussion with classmates. However, we know it's not always the easiest thing to speak up in a big classroom, or to clarify your thoughts in real time.

Therefore, you can also ask Laney questions directly via the Lecture Question forms. These are index cards you can fill out before, during, or after class; they will also be available by Laney's office in Meserve during office hours or any time.

Laney will review these questions during the break and after lecture, and respond during lecture or on Piazza, keeping you anonymous.

To create and preserve a classroom atmosphere that optimizes teaching and learning, all participants share a responsibility in creating a civil and non-disruptive forum for the discussion of ideas. This includes all ways you interact with classmates and course staff -- in lectures, office hours, Piazza, etc.

## Name and Pronoun Usage

As this course includes some discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform Laney of the necessary changes.

## Academic Integrity

Exams are solo endeavours; no books, notes, phones, or other devices are permitted other than the 8.5x11-inch cheat sheet.

On the other hand, homeworks and APPs can be collaborative. We expect that you might study with friends and work out solutions to problems together, but you must write up your own solutions, in your

own words. Copying solutions from a classmate or online source is a violation of our academic integrity policy and will result in a 0 on the assignment and a report filed with OSCCR.

Here are some concrete guidelines.

- Never look at someone else's homework solutions. Otherwise you might turn in overly similar work.
- If you produce a solution together, don't simply copy it down afterwards. You must, on your own, write your own solution in your own words.
- If someone or something explains an answer to you, do not write down their exact words; instead, on your own write up your solution afterwards.
- If you collaborate with (or get help from) any other student, then write their name on the the first page of your assignment at the top.

Violation of this policy has consequences both within the course and through the university's OSCCR office. For a first violation, you will receive a zero on the assignment. For a second violation, you will receive a failing grading in CS3000. All violations will be reported to OSCCR:

<http://www.northeastern.edu/osccr/academic-integrity>.

## Homework

Homeworks are assigned once per week. Homeworks are due at 9pm eastern on the due date, unless otherwise noted.

All homework solutions must be typed (preferably in [LaTeX](#)). We will provide the source files for the HW assignments to help you get started. Our first recitation will include a tutorial on LaTeX, and we'll link some resources on the course website.

It is encouraged that you work with your classmates on the homework problems. If you do collaborate, you must write all solutions by yourself, in your own words; you are also strictly forbidden from sharing any written solutions. You must list all of your collaborators on your submission.

You'll have an opportunity to resubmit one homework for a new grade at the end of the semester (details below).

## Homework Late Policy

You may submit homeworks up to 48 hours late with no penalty, but ***your submission will not be graded right away if it is submitted late***. The summer semester goes by quickly, and to ensure we grade homeworks in a timely manner, we will prioritize those submitted by the deadline.

If you ask for an extension beyond the 48 hours, I'll remind you that this policy exists for those weeks

when you have an issue like illness, busy-ness, family issues, etc.; no one is entitled to additional extensions except under extraordinary circumstances that go far beyond these common issues. If something very serious is going on, I'm going to be worried about you but won't grant any extensions unless I hear directly from WeCare or a similar source.

It's better to submit something than nothing! Even if your homework is incomplete, if that late deadline is approaching, submit whatever you have. We give partial credit, and it's better to have that than a zero

There is also **one second-chance deadline** this semester, which you can use to resubmit ONE previous homework.

- Deadline: **June 18th, 2025 at 9pm eastern**. You can use this second-chance homework to resubmit one of homeworks 1-5 for a new grade.

Homework solutions will not be released because of this policy, but we will go over all relevant homeworks at the recitation meetings preceding the exams.

## Recitations

The recitation for this class, CS3001, has two meetings per week, but **we will use only the Tuesday meeting for an official recitation section**.

You will have a practice problem set to complete during the Tuesday recitation, and we'll go over the solutions, but it won't be graded..

Thursday recitations will be fun algo-practice sessions, led by our TAs! We'll announce on Piazza each week what the theme will be and who your TA lead will be. These Thursday times will be excellent preparation for your co-op and job interviews.

Please check the schedule on the course website; recitation details vary week to week and we'll post reminders/announcements on Piazza and in class.

## Algorithm Practice Problems (APPs)

APPs will be assigned towards the end of roughly two lectures each week. You'll put together a solution to a short problem that we'll all use in the following lecture. We'll have time set aside to do these in class, or you can submit on your own.

APPs will be graded on completeness. They must be submitted by 11:30am (just before lecture) on the due date.

## APP Late Policy

APPs are not accepted late, but we drop 3 of them (out of 8 total).

## Exams

There are two exams during the semester, and they will be administered in-person, during class. Exam dates are:

- Thursday, May 22nd
- Thursday, June 12th

For each exam, you may bring one 8.5x11-inch paper as a cheat sheet, with anything written or typed on it (one side only). You will submit this cheat sheet along with your exam, and you are not permitted to use any other materials or notes during the exams.

If you have a DAS accommodation for extra time on exams, it is your responsibility to arrange to take the exams in the DAS office. Make sure you set this time up at least a week ahead of the scheduled exams to guarantee the time and space you need.

## Exam Late Policy

We expect everyone to be present for scheduled exams. In the case of an unforeseeable, unavoidable emergency that causes you to miss an exam, reach out to Laney directly **before** the exam date. I can't guarantee we'll be able to reschedule, but the earlier you reach out the better. If you reach out after the exam date, we won't be able to reschedule.

## Extra-Credit Exam Question

We will use the last day of class (June 18th) to offer an optional short, one-problem exam for anyone who wants to take it. You can earn up to 3 extra credit points that will be added to your average for the semester.

The problem on the exam will come from material at the end of the semester (i.e., material that has not been covered on a homework or a previous exam). No cheat sheets are permitted for the XC exam problem.

If you are not using the optional XC exam problem, then your last day of class is June 17th.

## Late/Attendance Policy

CS3000 is an in-person class, and attendance is expected. However, we don't take attendance and we don't want or expect anyone to come to class when they're sick. We'll post the lecture notes from each day, along with short-take videos, that you can use to catch up on any missed material.

These short-take videos were pre-recorded. **We do not record lectures in CS3000.** If you need to miss class/recitation...

- Watch the videos and read the notes posted from the given lecture.
- Complete and submit the APP for that day, if applicable, and work on the recitation problems on your own.
- Stop by Laney's or a TA's office hours to make sure you're caught up and feeling confident on the material.
- There is no need to notify us about missing class.

These short-take videos, plus the notes from class, are meant to be helpful for days when you need to miss class, but they will definitely NOT be an identical experience! They should suffice when you miss a class or two due to illness or emergency, but we do not recommend using them as a substitute for regular participation in the in-person lecture.

***You must be present in-person for scheduled exams.*** Dates are posted in this syllabus, on the course website, and on Canvas. Make sure you familiarize yourself with the schedule so that you don't miss the exams.

## Student Services

If you require support during the course due to a disability please ensure that you are already registered with the University's Disability Access Services, and contact Laney to coordinate any support needed during the course.

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here: [Northeastern OUEC](#).