

CPSC S365 Algorithms Syllabus  
Summer 2026

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## **An Important Note About Summer**

During the Fall and Spring semesters, this class is already notoriously a large time commitment, and that is with the material spread across 13 weeks. Over the Summer, we cover the same material and have nearly the same volume of work condensed to just 5 weeks. If you choose this class, be prepared to work hard. If you have the luxury of being able to register for just a single class, consider enrolling in only this course. For students studying abroad, as far as I've heard, you must enroll in a second course. I strongly recommend choosing a course that appears to have a lighter volume of work.

# Course Staff

## Instructor

Hi! My name is Dylan McKay. I'm a teaching faculty member here at Yale, and I'm really excited for this semester! I'm perfectly happy being called "Dylan" or "Professor".

**Pronouns** - He/him/his

**Office** - DL 418

**Email** - My email is my first initial dot last name at yale dot edu. Apologies for the awkward formatting, but I'm trying to avoid getting my email scraped by bots!

## Teaching Assistant

We may have one or more teaching assistants for the course, depending on the enrollment levels.

# Why am I taking this class?

## Overview

In this course, we will study the design and analysis of algorithms. We will learn many important algorithms and develop an understanding of how we can design our own algorithms.

This is a theory course, and we will not be coding for any of our assignments. Instead, we will practice describing algorithms at a high level as well as writing pseudocode, and we will support our algorithms with proofs.

## Learning Goals

Here are some reasons why you'll benefit from taking a class on Algorithms! You'll...

- ...learn about and practice thinking about computational problems abstractly.
- ...learn to recognize variety of tractable and intractable problems.
- ...learn cool algorithms and techniques for making your own.
- ...learn many of the important ingredients for crushing technical interviews!

When you leave this class, you should expect to:

- ...know a variety of algorithms and how to apply them.
- ...be more capable of thinking about computational problems abstractly.
- ...be more capable of seeing problems as other problems.
- ...know a variety of techniques for designing algorithms.
- ...know how to prove correctness and analyze running times for simple and some advanced algorithms.

Throughout the course, we will be practicing the following skills:

- **Mathematical reasoning:** You will be writing lots of proofs in this course.
- **Abstraction:** Both in relating the theoretical concepts we study to practice in relating them to each other, you will learn to identify the structurally important aspects of a problem.
- **Reduction:** We will spend a great deal of time thinking about how solutions to one problem open up or narrow avenues of attack for others.

The following is an estimated schedule of topics which is subject to change and may vary depending on the pace of the course.

- Week 1: Beginning algorithm design and Divide and Conquer Algorithms
- Week 2: Finish Divide and Conquer Algorithms and Graph Search and Shortest Path Algorithms
- Week 3: Heaps, Hash Tables, and Beginning Greedy Algorithms
- Week 4: Minimum Spanning Trees, Dynamic Programming, and Shortest Paths with negative edge weights
- Week 5: Network Flow, P vs NP, and NP-completeness

# Which materials do I need for this class?

The short answer is you don't need anything other than the electronic device you will use to attend lectures, access course materials, and submit assignments. However, you may find additional materials useful! I **strongly** recommend the following books if you tend to find written material is useful for your ability to succeed in a class.

## Books

Any work I assign will be available through Canvas, so strictly speaking, you are not required to have any textbooks for this course.

However, I strongly recommend having access to the following books:

1. Algorithms Illuminated (Omnibus Edition) by Tim Roughgarden. This is a new book which I will be loosely following in my plan of this course. My reason for choosing this book is that I have a lot of confidence in the author of this book, and he has made supplementary material for this book freely available, including his own lectures on YouTube. The "Omnibus Edition" is the complete edition of this book.
2. Algorithm Design by Kleinberg and Tardos. In my experience, this is one of the best-written books on Algorithms, and it contains some materials which we will cover in our class which are not covered in the Roughgarden book mentioned above. The material in this book has a nice, logical flow. Any edition of this book is fine.
3. Introduction to Algorithms by Cormen, Leiserson, Rivest, and Stein. This book is affectionately referred to as CLRS and is generally considered the go-to reference on Algorithms. There are some topics I am considering covering which are in this book and not found in the other two. Any edition of this book is fine.

## In Class

Nothing is required, but I will frequently ask you to take time to think about problems, and it may be useful to have something to write on and something to write with in these moments.

## Software

At bare minimum, you'll need access to a web browser. Our assignments will be accessible via Canvas.

**LaTeX** - You will not be expected to TeX your homework solutions, but you are strongly encouraged to do so. Typing your homework will make it much easier to revise, and it will also make it easier to grade. I personally really like to use Overleaf (<https://www.overleaf.com/>) if you would like a recommendation!

# Course Requirements & Expectations

## What makes up my final grade?

The work you complete for the class can be broken up as follows.

- Attendance
- Formative assessments: the work which is meant to challenge you and help you learn the material. This include five written problem sets and five electronic problem sets.
- Summative assessments: the work which allows you to demonstrate that you have learned the material. This includes a “half” quiz, three more quizzes, and an exam.

## How is my final grade determined?

The following chart breaks down the weight of each category.

Written Problem Sets	10%
Electronic Problem Sets	10%
Attendance and Participation	10%
Quiz 1	7%
Quiz 2	14%
Quiz 3	14%
Quiz 4	14%
Exam	21%

## Quizzes Outside of Class Time

To save our precious lecture time, we will hold the quizzes outside of class. The plan is to do so on Fridays after class and a break. However, we will agree as a class on schedule of quizzes to ensure it works for everyone. Our exam will be held during our final lecture period, but we will extend the window of time to ensure you have plenty of time for the exam.

## Homework Policy

**Due dates** - Problem sets will be due each Friday morning before class.

**Collaboration** - Read the section on the [honor code](#).

## Honor Code

You are expected to submit your own work written in your own words. The homework in this class is meant to help you learn, and however you do the homework should be in support of that goal.

**Collaboration and LLMs** - It is just too exhausting at this point to keep reporting students for cheating on homework. The homework is your opportunity to learn the material. If you have ChatGPT do your homework or copy it from a peer, then your punishment may just end up being that you didn't learn what you needed to do an exam problem which was worth more than the homework assignment was. If your plagiarism is obvious, it will still be reported, and you will receive a 0 on your assignment.

**Academic Dishonesty with Exams** - I take quizzes and exams much more seriously. If you are found to be in violation of the rules set by our assessments or anything else that is commonly understood as academic dishonesty which has not been explicitly allowed, you will receive a 0 on the assignment, a report to the Yale College Executive Committee, and I reserve the right to give issue a failing grade in the course.

**A note about being forthcoming** - We all make mistakes. Wisdom is earned by learning from those mistakes. You may find yourself rationalizing the cheating. You may not believe it is wrong. But if you are found to be in violation of our academic honesty policies, I don't really care to hear your rationalizations. I will feel much better interacting with you if you are forthcoming about your actions. I'm not your enemy, and I'm not the police. My primary goal is not justice. It is education. If you treat me as an enemy or a fool, then you will be robbing yourself of my ability to be a valuable mentor. If you come clean, we can get take the opportunity to learn from the experience and to get you the help you need.

## **Accessibility and Accommodations**

I'll try my best to ensure that everyone have what they need to learn! Please speak to me as soon as possible so that I have time to make suitable arrangements. I cannot promise that I'll be able to do things the way you would like, but I will hear you out and do what I can within the scope of what is reasonable.