

# A<sup>3</sup> Introduction

## 1. Introduction

Hey everyone! Welcome to the *All About Algorithms* club, where we'll explore algorithms in computer science. Algorithms have a lot to do with math, which is why they're one of my favorite aspects of computer science; plus, they're just cool in general! If you have any questions, you can email me at [lanbae23@bergen.org](mailto:lanbae23@bergen.org), or Discord friend/message me ([Lance#1721](#)). Plus, Autumn ([arrshi22@bergen.org](mailto:arrshi22@bergen.org)) and Jaiden ([jaishi23@bergen.org](mailto:jaishi23@bergen.org)) agreed to help me out; they're just as good (if not better) than me with competitive programming, so feel free to contact them too!

## 2. Resources

I'll be uploading all of the material for this club on my Github repository, which you can find [here](#). Github is a super useful resource for coding projects, and I highly recommend familiarizing yourself with it if you haven't already. I'm also pretty sure Mr. Wang reviews it in Intro to Comp Sci, so this'll give you freshmen a head start!

Please note that things such as hyperlinks and password protection are not compatible with Github, so you will probably have to download the pdfs in order to access them; sorry for any inconvenience.

There's a Discord server you can join [here](#), where you can collaborate with one another and ask questions throughout the week.

All of the problem sets and solutions will most likely be written in Jupyter Notebooks (also a super helpful resource!). For introductory problem sets, we'll write solutions in both Python and C++. As for intermediate, we'll write solutions in only C++, as Python will not be fast enough for harder problems. Hence, I highly recommend learning C++ if you haven't already; it'll definitely come in handy down the road. Resources for learning Python and C++ can be found in Introductory Problem Set 1! As for Java, although it is usually fast enough for harder problems, we still recommend that you use C++ (pointers are cool!).

All problem set solutions will be password protected so that only club members can access them. Official solutions can be confusing at times, so we thought it would be best to write our own. If you need a password for a solution, let us know.

Most, if not all, problems will come from [USACO](#), [Codeforces](#), or [Leetcode](#), so make sure to create your accounts for these before our first official meeting.

As for the lecture series, I will be using material from various textbooks (I may be able to get you a digital copy if you'd like) and my own knowledge.

Because most of this material will be made manually by us, we ask that you **do not distribute it without our consent**.

## 3. What's a typical meeting going to look like?

For regular meetings, we'll have three breakout rooms: Introductory, Intermediate, and Advanced. We know that it might be awkward talking to people you don't know/haven't met in person, but we really encourage that you all collaborate verbally on problems! If you're able to create these relationships now, they'll prove to be valuable as you progress throughout your programming career.

Introductory problem sets will be for those who have just gotten started with competitive programming and aiming to familiarize themselves with USACO Bronze questions. Intermediate problem sets will be focused on those who are pushing to pass Bronze or looking to familiarize themselves with Silver strategies. The Advanced sessions will be for everyone else and we'll instead do something like a "Problem of the Day".

I will be giving a few optional lecture series throughout the duration of this club. I expect students in the Intermediate/Advanced problem sessions to attend these lectures, but it is ultimately up to you. During weeks when there are lectures, we will have only one breakout room going on and help will most likely be unavailable during club time. This would be a good opportunity to use the Discord server if you need help!

### 3.1 Current Virtual Situation

Because of our current situation with clubs being optional, I will try to host lectures (and only lectures; no problem sessions) on Wednesdays after school (probably from two to three). Of course, attendance at these meetings will not be required. If you're not looking to attend lectures but still want to work on algorithms, you can work on the problem sets on your own time. If you ever need a more detailed explanation or are still confused by our solutions, ask on the Discord!

Also, if you know anyone who might be interested in attending these lectures, feel free to invite them; just let me know beforehand.

[Zoom Link](#)

ID: 294 476 0999

PW: 2tRJnt

## 4. Lectures (optional)

Lectures, in my opinion, will be the highlight of this club. They'll be rigorous, involve different aspects of math, and certainly improve your understanding of algorithms in computer science (which is fun)! However, I want to make sure that everyone attending lectures will be able to understand each and every part of them. Because of this, I recommend caution if you're going to attend; if you're unsure if lectures are right for you, feel free to sit in on a couple and evaluate from that.

Currently, the first two topics below are 100% going to be covered first, and I am considering the rest:

- Stable Matching
- Runtime Analysis
- Graph Theory Hodgepodge
- Graph Algorithms
- RSA Encryption (with some Quantum Computing concepts)
- Deep Learning (DIY aspect!)
- P vs. NP

Lecture series may go deep into mathematics and proofs depending on the topic, which will require multiple weeks to cover. There may not be enough time for every topic, so we'll vote on which topics to go over once we get there.

I expect there to be  $\geq 1$  week break inbetween lecture series, so those who attend also get the chance to be a part of problem sessions. **This is for when things go back to "normal". While we're fully virtual, there won't be any problem sessions (but there may still be some breaks).**

To be honest, I am actually going to **discourage** researching these topics before the lecture series. After all, what's the fun in learning something you already know?

If there's a specific topic you want to see discussed, let me know!

## 5. Commitment

This club is supposed to be fun! There won't be any assigned work, but we will be more than happy to supply extra problems if you want! If you're truly passionate about learning in this club, then we promise to make it as enjoyable as possible.

However, one part that I am going to *require* is that everyone asks questions. Whether it's during a lecture or about a solution, ask! This way, we can ensure that everyone is truly grasping the material.

Also, we're students too; we understand that there are days where you're swamped with work or just feeling under the weather. If that's the case, let us know and we'll do our best to help out!

### Formatting

```
In [1]: from IPython.core.display import display, HTML
display(HTML("<style>.container { width:85% !important; }</style>"))
```