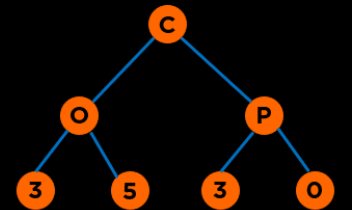


# Data Structures & Algorithms

COP 3530 : Spring 2022



# About Me: Amanpreet Kapoor

- Educator
- CS Education Researcher
- Mentor
- Software Engineer
- Lifelong Learner



[kapooramanpreet@ufl.edu](mailto:kapooramanpreet@ufl.edu)

# Course Staff



Katie  
(Teaching Lead)



Andrew  
(Slack Lead)



Rob  
(Infrastructure Lead)



Ayswarya



Andrew



Dhruv



Dustin



Julia



Kunyao



Robin



Victoria

Michael

# Learners: Let's Get to Know You

**Go To Menti.com**

**Code: 8343 0152**



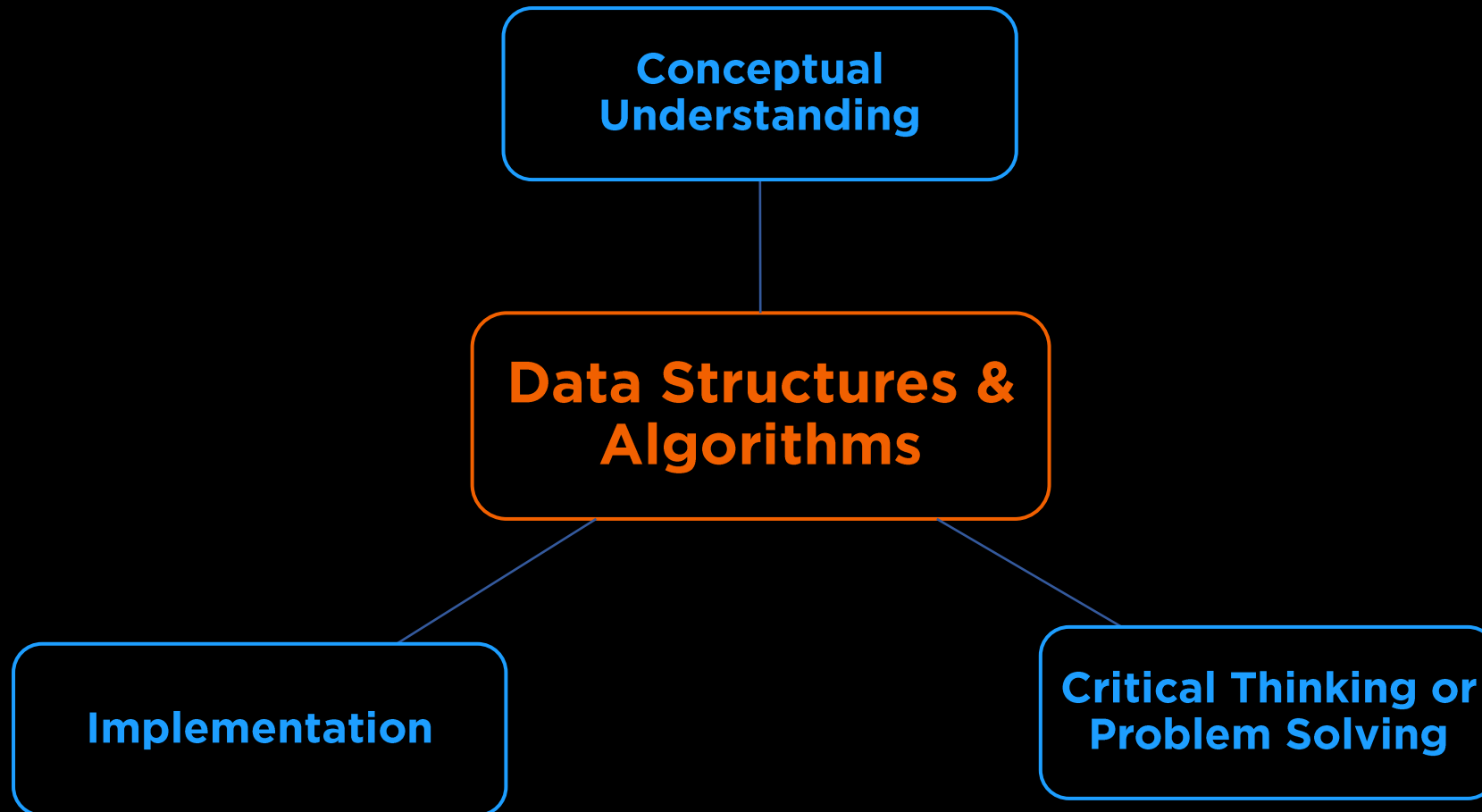
# Course Objectives

# What is this Course About?

**This course covers algorithm development using**

- **pseudo languages**
- **basic program structures**
- **program design techniques**
- **storage and manipulation of basic data structures**
- **3 Credit Hours**

# What is this Course About?



# Categories of Data Structures

**Linear Ordered**

**Lists**

**Stacks**

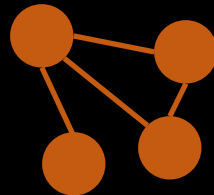
**Queues**



**Non-linear Ordered**

**Trees**

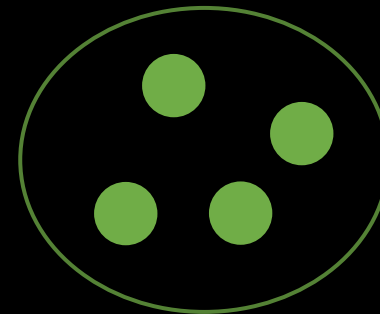
**Graphs**



**Not Ordered**

**Sets**

**Tables/Maps**





# Categories of Algorithms

**Brute Force**

**Selection Sort**

**Bubble Sort**

**Insertion Sort**

**NP Complete Problems**

**Divide & Conquer**

**Binary Search**

**Merge Sort**

**Quick Sort**

**Greedy**

**Minimum Spanning Tree**

**Shortest Paths**

**Dynamic Programming**

**Knapsack**

**Fibonacci**

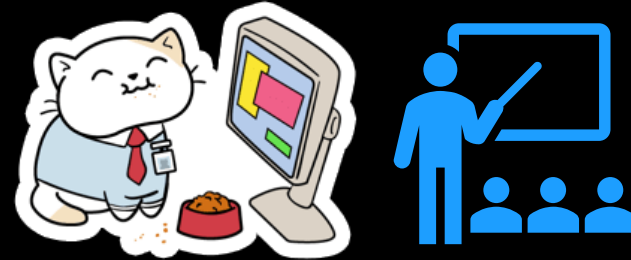


# Logistics & Policies

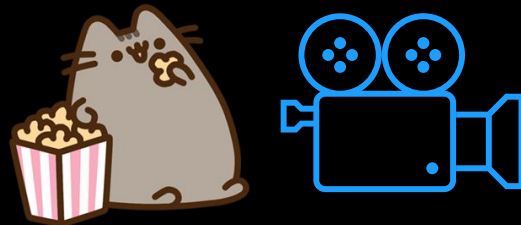
# Format



Action Items by  
Monday morning



Optional: Attend  
synchronous discussions  
on Tue.



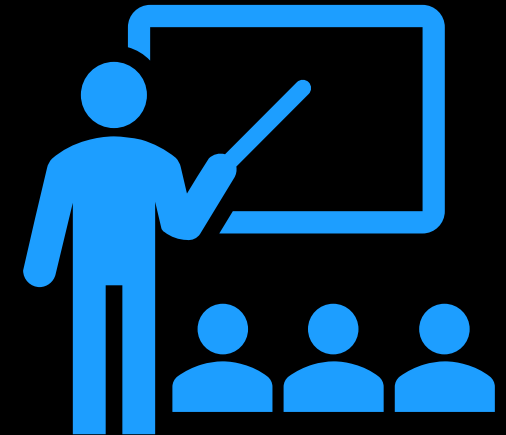
1. Attend or watch lectures **synchronously** on Mon, Wed, and Fri.
2. Optional: Watch recorded lectures **asynchronously** later.



1. Quiz due on Tue and Fri.
2. Stepik questions due on Sun.

# Attending Campus Lectures

- You are recommended to wear approved face coverings at all times during class and within buildings even if you are vaccinated. If you are sick, stay home and self-quarantine. You could attend the lecture via zoom instead.
- Those who attend should be cleared to attend campus on one.uf
- Attendance is optional and you do not have to inform the Instructor or the course staff that you are not attending the campus class but instead the online lecture any day throughout the semester



# Communication

## Slack



- Everything!
  - for all question related to the course
  - for communicating with peers
  - one-to-one communication with me
- Use Appropriate Tags
- Response in < 48 business hours

## Office Hours



- TBD
- By Appointment (24 hours in advance)
- 11 am – noon on Thursday this week

# Communication



**Email**

**Fine for**

- **Personal**
- **Accommodations**
- **Emergencies**



**Email**

**Not okay for**

- **Questions regarding logistics**
- **Questions on coding**
- **Fixing bugs**

# Communication

  
~~Canvas Messages~~

  
~~Phone Call~~



# Debugging

- Students should visit the course staff during scheduled office hours for help and provide context for help.
- Debugging requests for projects/quiz questions must first go through the TAs or peer mentors. This is strongly encouraged given we have a large class and several of you might have similar questions.
- If your problem is not fixed, then start a conversation with both the Instructor and the TA/Peer mentor who you asked for help. Debugging requests to the Instructor as a Slack direct message or an email will be ignored if you do not follow the above protocol.



# Grading

Modality	Assignment	Weightage	% of Final Grade
Individual	Programming / HTG Quizzes (11, drop two lowest scores)	1% x 9	9%
	Conceptual Quizzes (11, drop two lowest scores)	1% x 9	9%
	Exam 1	14%	14%
	Exam 2	14%	14%
	Exam 3 (Final Exam - Cumulative)	14%	14%
	Project 1	10%	10%
	Project 2	10%	10%
Collaborative <sup>#</sup>	Final Project (Individual or Group: 3a & 3b)	2% + 6% + 2*%	10%
	Preassigned Stepik Questions (18, Drop six lowest scores)	0.83% x 12	10%
Individual	Extra Credit Opportunities & Bug Bounty Program	Up to 2%	2%
			Total: 102%
* Denotes peer-graded components. 2% of your grade will be evaluated by your peers. # You are allowed to collaborate on preassigned stepik problems, but you must cite the peer who you worked with.			

# Timeline

Week	Dates		Topic	Deadlines
0	5-Jan	7-Jan	Course Introduction	
1	10-Jan	14-Jan	Algorithm Analysis	$Q_1$
2	17-Jan	21-Jan	List, Stacks, & Queues	$Q_2$
3	24-Jan	28-Jan	Trees & Traversals	$Q_3$
4	31-Jan	4-Feb	Balanced Trees 1 / Project 1	$Q_4$
5	7-Feb	11-Feb	Balanced Trees 2	$Q_5, Q_6$
6	14-Feb	18-Feb	Heaps & Priority Queues	$P_1$
7	21-Feb	25-Feb	Exam 1 / Sorting	$E_1$
8	28-Feb	4-Mar	Sets, Maps, & Hashing	$Q_7, P_{3a}$
	7-Mar	11-Mar	Spring Break	
9	14-Mar	18-Mar	Graphs 1 / Project 2	$Q_8$
10	21-Mar	25-Mar	Graphs 2	$Q_9$
11	28-Mar	1-Apr	Greedy Algorithms	$Q_{10}, P_2$
12	4-Apr	8-Apr	Exam 2 / Project 3 work week	$E_2$
13	11-Apr	15-Apr	Dynamic Programming	$Q_{11}$
14	18-Apr	20-Apr	Complexity Theory	$P_{3b}$
15	22-Apr	28-Apr	Final Exam	$E_3$
Legend: $Q_N$ = Programming and Conceptual Quiz N, $P_N$ = Project N, $E_N$ = Exam N				

# Programming Language

**Default (Project 1 & 2, Stepik Exercises, Quizzes):**

**C++11**

```
g++ -std=c++11 your_file.cpp -o your_program
```

**Project 3 or Final Project:**

**Any Language**

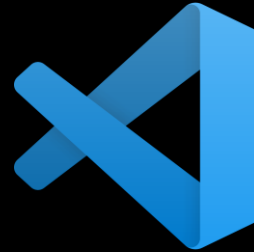
# Tools

## Compiler

- G++
- Stepik/EduGator

## IDE

- OnlineGDB
- Visual Studio Code
- Clion



# Textbook (Optional)

- **Data Structures and Algorithm Analysis in C++**
  - Mark Allen Weiss
  - Fourth edition, 2014, ISBN 9780132847377
- **OpenDSA Book**
  - <https://opensa-server.cs.vt.edu/OpenDSA/Books/Everything/html/index.html>

# Feedback

- COP 3530 Feedback Form
- Bug Bounty Program : Upto 1% EC in Range 0.2-1% per Bug
  - Quiz is not accessible due to a locked module
  - Typo in one of the quizzes/project descriptions
  - Incorrect solution in a certain test case
  - An accessibility bug such as no headings in documents for screen-readers
  - the algorithm has an off-by-one error

# Expectations

- **We want you to focus on**
  - Correctness
  - Clean, readable, tested, and documented code
  - Secondary focus on optimization
- **The course will not cover**
  - Mathematical Proofs
  - Design Patterns
  - Competitive Programming

# Academic Dishonesty

Quiz questions on Stepik, Quiz questions on Canvas, and Exams:

- Work independently
- No discussion at the conceptual level
- You are allowed to
  - discuss solutions after the due date and late days have passed.
  - search for C++ syntax or refer to definitions of standard functions in the C++ library. For example, using the documentation listed here is fine:  
<https://www.cplusplus.com/reference/> or <https://en.cppreference.com/w/>



# Academic Dishonesty

Project 1 and 2:

- **Work independently**
- Discussion at the conceptual level is fine if you are stuck with no sharing/viewing of code
- **You are allowed to**
  - **discuss conceptually** without discussing any code with a peer provided you cite the peer with who you discussed it. Such discussions should be held **on a whiteboard** using explanation figures/pseudo-codes or through talking.
  - discuss **solutions after the due date and late days** have passed.
  - search for C++ syntax or **refer to definitions of standard functions in the C++ library**.  
For example, using the documentation listed here is fine:  
<https://www.cplusplus.com/reference/> or <https://en.cppreference.com/w/>

# Academic Dishonesty

Project 3, Stepik weekly assigned questions, and Stepik ungraded questions:

- It is fine to **collaborate with peers**. You must make sure you are not blindly copy-pasting another student's code. Also, **you must cite the peer you worked** with at the code level or conceptually.

# Academic Dishonesty

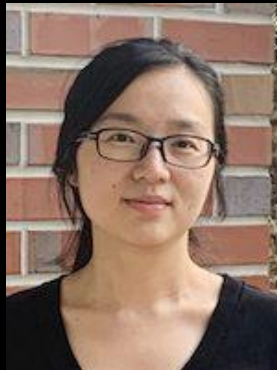
- Sharing/copying, “borrowing” of code structure, looking at code from another student or providing such code, and plagiarism, in addition to other dishonest behaviors, are all considered to be academic dishonesty.
- No information regarding the project 1 and 2, quiz, and exam solutions may be shared by students. We strongly encourage that if you have doubts, visit the course staff in-office hours. Looking at any piece of your peer’s code, sharing files, searching for solutions found online, or using someone else to code your solution is strictly prohibited.
- Penalty
  - zero on that assignment and a two-letter final grade decrement for a first offense
  - E grade for second offence
  - For both offenses, you will be reported to the Honor Court

# Acknowledgements



**Cheryl Resch**

**Lecturer,  
Dept. of Engineering Education,  
University of Florida**



**Lisha Zhou**

**Lecturer,  
Dept. of Engineering Education,  
University of Florida**

# References

- Books/Notes

- [Dr. Sartaj Sahni](#)
- [Dr. James Aspen](#)
- Dr. Mark Weiss
- OpenDSA
- [Dr. Cathy Hughes](#)

- Videos Authority

- [Dr. Josh Hug](#)
- [MIT OCW 6.006](#): Dr. Erik Demaine and Dr. Srinivas Devadas
- [Dr. Robert Sedgewick](#)

- Videos Youtube

- [HackerRank: Data Structures](#)
- [HackerRank: Algorithms](#)
- [Back To Back SWE](#)
- [MyCodeSchool](#)
- [Abdul Bari](#)

- GeeksforGeeks

# Walkthrough

# Walkthrough

- **Canvas**
- **OpenDSA**
- **Slack**
- **Stepik/Eduigator**

# Slack

The screenshot displays the Slack web interface. On the left is a dark purple sidebar with a list of channels and direct messages. The current channel, **# announcements**, is highlighted. The main workspace area on the right shows the channel header with the name **# announcements** and a member count of 78. Below the header is a large empty space for messages. A system message states: "You're looking at the #announcements channel. This is the one channel that will always include everyone. It's a great spot for announcements and team-wide conversations. [Edit description](#)". A message from **Aman - Instructor** at 8:59 PM says "changed channel posting permissions." At the bottom is a message input field with a placeholder "Send a message to #announcements" and a rich text editor toolbar.

**cop3530sp22**

**# announcements** + Add a bookmark A 78

**# announcements**

You're looking at the **#announcements** channel  
This is the one channel that will always include everyone. It's a great spot for announcements and team-wide conversations. [Edit description](#)

**December 26th, 2021**

**Aman - Instructor** 8:59 PM  
changed channel posting permissions.

**B** *I*

Send a message to #announcements



**To Do**

# Next Steps

- **Join Slack and greet your peers**
- **Complete Stepik Invite Request**
- **Complete Office hours poll**

# Questions