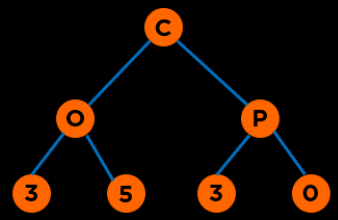
Data Structures & Algorithms

COP 3530 : Spring 2026



Data Structures & Algorithm

About Me: Amanpreet Kapoor

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

kapooramanpreet@ufl.edu

Course Staff

Tavienne
Teaching Lead

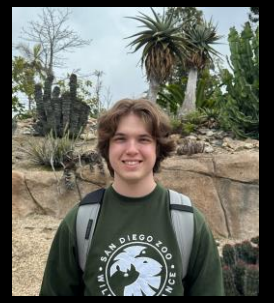
Ananya

Jackie

Sampada

Clarissa

Adrian



Cole

Manav

Emma

Dogan

Josh

Shahaddin

Ananya

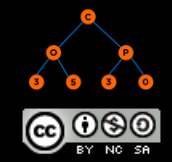
Paul, Max, Nikhil, Chase

Learners: Let's Get to Know You

Go To Menti.com

Code: 1838 4075

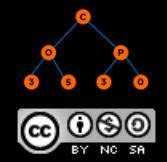
Course Objectives



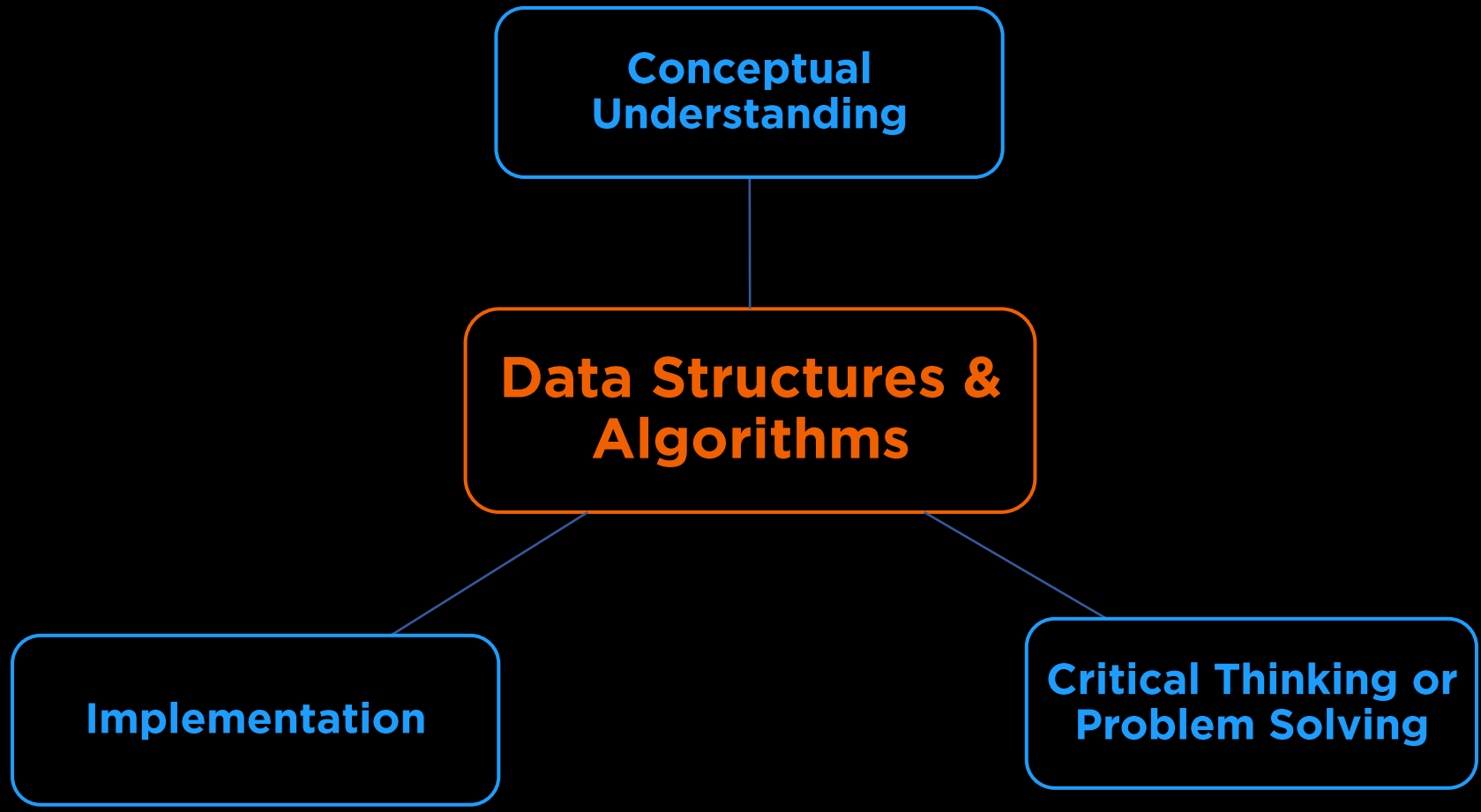
What is this Course About?

This course covers algorithm development using

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

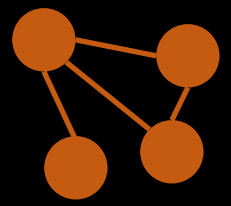


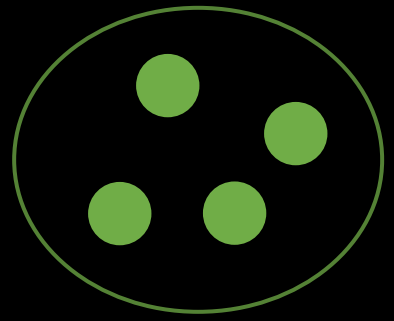
What is this Course About?



Categories of Data Structures

Linear Ordered	Non-linear Ordered	Not Ordered
Lists	Trees	Sets
Stacks	Graphs	Tables/Maps
Queues		

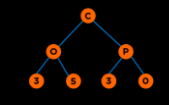




Categories of Algorithms

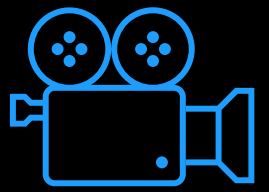
Brute Force	Divide & Conquer	Greedy	Dynamic Programming
Selection Sort	Binary Search	Minimum Spanning Tree	Knapsack
Bubble Sort	Merge Sort	Shortest Paths	Fibonacci
Insertion Sort	Quick Sort		
NP Complete Problems			

Logistics & Policies



Format

Action Items by Monday morning



Watch lectures synchronously on Tue and Thu in person or live via Zoom. UFOL/UDER students can watch prerecorded videos or the recorded lectures.

Attend discussions on Tue.

1. Conceptual Quiz due on Sun.
2. Programming Quiz due on Sun.

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

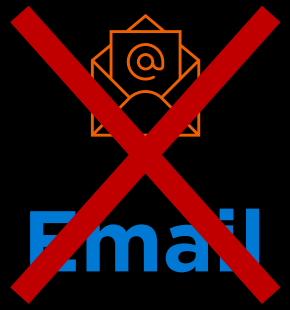
- Monday, 10:30-11:30 am
- Thursday, 5-6 pm
- By Appointment (24 hours in advance)

Communication

Email

Fine for

- Personal
- Accommodations
- Emergencies



Email

Not okay for

- Questions regarding logistics
- Questions on coding
- Fixing bugs

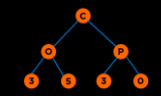
Communication

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	% of Final Grade
Individual	Programming / HTG Quizzes (drop two lowest scores)	10%
	Conceptual quizzes (drop two lowest scores)	10%
	Exam 1	20%
	Exam 2	20%
	Project 1	12%
	Project 3	12%
	Class participation (drop four lowest scores)*	3%
	Discussion participation (drop four lowest scores)*	3%
Collaborative	Project 2 (Individual or Group: 2a & 2b)	10%
Individual	Extra Credit Opportunities	Up to 2%
		Total: 102%
* Online and Asynchronous for UFOL (10616) & UDER (16325) students will be provided with alternate coding problems that they can complete to substitute these grades. Synchronous participation is optional for them.		

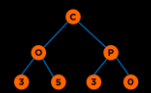
Total assessments: 26 excluding extra credit and class/discussion participation

Timeline

Week	Dates		Topic	Deadlines
1	12-Jan	18-Jan	Course Introduction/Algorithm Analysis	
2	19-Jan	25-Jan	List, Stacks, & Queues	Q_1, Q_2
3	26-Jan	1-Feb	Trees	Q_3
4	2-Feb	8-Feb	Balanced Trees 1	Q_4
5	9-Feb	15-Feb	Balanced Trees 2	Q_5
6*	16-Feb	22-Feb	Heaps & Priority Queues / Sorting	P_1
7	23-Feb	1-Mar	Exam 1 (Feb 26, 8:20 pm EST)	E_1, Q_6
8	2-Mar	8-Mar	Sets, Maps, & Hashing	P_{2a}
9	9-Mar	15-Mar	Graphs 1	Q_7
10	16-Mar	22-Mar	Spring Break	
11	23-Mar	29-Mar	Graphs 2	Q_8, P_{2b}
12	30-Mar	5-Apr	Greedy Algorithms	Q_9
13	6-Apr	12-Apr	Dynamic Programming	
14	13-Apr	19-Apr	Exam 2 (Apr 14, 8:20 pm EST)	E_2
15	20-Apr	22-Apr	Complexity Theory	Q_{10}, P_3

Legend: Q_N = Quiz N, P_N = Project N, E_N = Exam N

*** Lecture on Feb 19 will be pre-recorded due to work travel.**



Programming Language

Default (Project 1 & 3, Edugator, Quizzes):

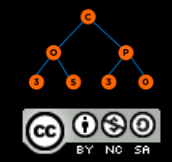
C++14

Compilation command:

```
g++ -std=c++14 -Werror -Wuninitialized -o EXECUTABLE_NAME YOUR_FILE.cpp
```

Project 2:

Any Language



Tools

Compiler

- G++
- Edugator/Gradescope

IDE

- OnlineGDB
- Visual Studio Code
- Clion

Tools

Directory Structures

- src – includes .h and .cpp files

  (You can use lib/ too for separating interfaces - .h)

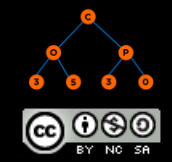
- test – contains test files
- build – contains executables (e.g. .exe)

- Know basic commands on compilation through command line:
  - cd, ls, mv, g++, pwd …

https://cplusplus.com/forum/beginner/261697
https://stackoverflow.com/questions/2360734/whats-a-good-directory-structure-for-larger-c-projects-using-makefile

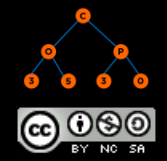
Textbook (Optional)

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



Feedback

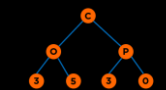
- COP 3530 Feedback Form
- Bug Bounty Program
  - Quiz is not accessible due to a locked module
  - Typo in one of the quizzes/project descriptions
  - Incorrect solution in a certain test case
  - An accessibility bug such as no headings in documents for screen-readers
  - the algorithm has an off-by-one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

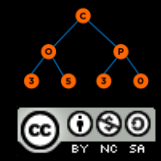


Expectations

Conceptual Quizzes 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.

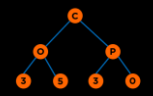


Expectations

Programming Quiz questions:

- Work independently or as a pair (Select a buddy in Week 1).
- The buddy must remain the same for the entire course.
- The course staff can help you on syntax issues, but we will not help you with semantic and logic issues for quizzes.
- Cite that you worked with a buddy in Line 1 of your code and add their name.

- 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/

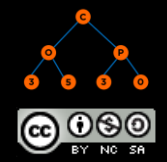


Academic Dishonesty

Project 1 and 3:

- Work independently
- Discussion at the conceptual level is fine if you are stuck with no sharing/viewing of code

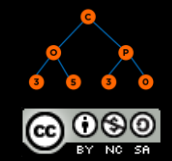
- You are allowed to
  - discuss conceptually without discussing any code with a peer provided you cite the peer with who you discussed it. Such discussions should be held on a whiteboard using explanation figures/pseudo-codes or through talking.
  - discuss solutions after the due date and late days 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

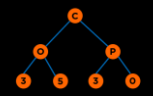
Project 2 and Edugator ungraded questions:

- 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 and GenAI policy

- Sharing, copying, “borrowing” code, viewing another student’s work, or plagiarism of any form is academic dishonesty. You may not view or share external code, search for solutions online, use genAI tools such as ChatGPT to generate entire functions/programs, use AI tools to write/translate reports, or have someone else complete your work.
- AI tools may be used for learning concepts or subtasks, but not to produce solutions for quizzes, exams, or projects. If GenAI tools are used for learning, you must cite the tool, model, and prompt.
- Penalty
  - reported to the Honor Court
  - E grade for the course
- Regret Clause:
  - If you submit an assignment, in which you engaged in some of the unacceptable practices, you may bring it to my attention by emailing me and withdrawing your assignment within 48 hours of the submission. If you do so, I will assign a failing grade of 0 for the assignment, and you will not be reported to the administration.

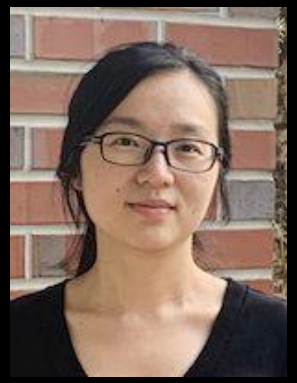


Request for Extensions

- Any request for assessment extensions should be backed by official documentation (e.g., from a medical professional, etc.) and should be sent over email. Requests without documentation will be ignored. The following reasons deem ineligibility for extensions or regrades:
  - Failure to submit on Canvas by due date/late date. Example: If a quiz is due at 11:59 pm, and you send the file at 12:01 am, the file will not be graded. Note that most assessments are open for 4 or more days and you must start early and submit it on time. In case you miss an assignment, treat it as a learning activity and avoid that in the future.
  - Forgetting to turn in an assessment on time.
  - File naming issues or feedback issues on projects. Gradescope gives you feedback and please read it and fix your file and resubmit. Note that you have unlimited attempts on Gradescope for everything and we will not grade your files if you do not adhere to instructions on file submissions and/or if the Gradescope scores your file to 0. It is your responsibility to read the feedback and fix your code. In case you miss reading the feedback, treat it as a learning activity and avoid that in the future.

Acknowledgements

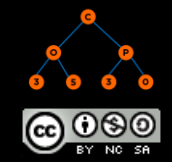
Cheryl Resch
Lecturer,
Dept. of Engineering Education,
University of Florida



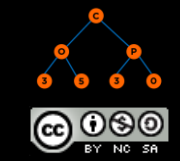
Lisha Zhou
Lecturer,
Dept. of Engineering Education,
University of Florida

References

- Books/Notes
  - Dr. Sartaj Sahni
  - Dr. James Aspen
  - Dr. Mark Weiss
  - Dr. Clifford Shaffer
  - OpenDSA
  - Dr. Cathy Hughes
- Videos Authority
  - Dr. Josh Hug
  - MIT OCW 6.006: Dr. Erik Demaine and Dr. Srini Devadas
  - Dr. Robert Sedgewick
- Videos Youtube
  - HackerRank: Data Structures
  - HackerRank: Algorithms
  - Back To Back SWE
  - MyCodeSchool
  - Abdul Bari
- GeeksforGeeks

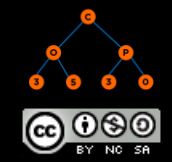


Walkthrough



Walkthrough

- Canvas
- OpenDSA
- Slack
- Edugator
- Gradescope



Questions