

## Data Structures & Algorithms

COP 3530 Section 6723, 10ZE, 1079, 19G7, 15A6, 19GG, 2ZED, 19HD, OVER, OVR1, UFOL, UDER

**Academic Term:** Spring 2024

### Class Periods, Modalities, and Locations:

**Lecture** M, W, F | P8 (3:00 PM - 3:50 PM)

Modality: In person @TUR L007  
& live via Zoom

**Discussion** You must join your respective discussion:

Modality: In person only.

Time	Location	Class Number
T   P3 (9:35 AM - 10:25 AM)	MCCA 2196	10890
T   P4 (10:40 AM - 11:30 AM)	WEIL 0234	10891
T   P5 (11:45 AM - 12:35 PM)	MCCB G108	10892
T   P6 (12:50 PM - 1:40 PM)	MCCB G108	10893
T   P7 (1:55 PM - 2:45 PM)	MCCA 2196	10852
T   P7 (1:55 PM - 2:45 PM)	MCCB G108	26873
T   P9 (4:05 PM - 4:55 PM)	MCCB 2102	26071
T   P10 (5:10 PM - 6:00 PM)	WM 0202	10853
T   P11 (6:15 PM - 7:05 PM)	CSE E221	30948
T   P11 (6:15 PM - 7:05 PM)	CSE E220	27997
TBD	ONLINE	19895, 10889

### Instructor

Amanpreet Kapoor

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

Office Hours on Zoom: - Monday 4:30-6:30 pm  
- Or by Appointment (Request 24 hours in advance)

### Teaching Assistants/Peer Mentors

Allen, Kevin	<a href="mailto:kallen2@ufl.edu">kallen2@ufl.edu</a>	Li, Eugene	<a href="mailto:lieugene@ufl.edu">lieugene@ufl.edu</a>
Bao, Haohui	<a href="mailto:haohui.bao@ufl.edu">haohui.bao@ufl.edu</a>	Lin, Christine	<a href="mailto:ch.lin@ufl.edu">ch.lin@ufl.edu</a>
Barrios, Santiago	<a href="mailto:santiago.barrios@ufl.edu">santiago.barrios@ufl.edu</a>	Lu, Emily	<a href="mailto:emily.lu@ufl.edu">emily.lu@ufl.edu</a>
Chase Mooney, Richard	<a href="mailto:rchase.mooney@ufl.edu">rchase.mooney@ufl.edu</a>	Magnuson, Brian	<a href="mailto:b.magnuson@ufl.edu">b.magnuson@ufl.edu</a>
Cortese, Benjamin	<a href="mailto:benjamin cortese@ufl.edu">benjamin cortese@ufl.edu</a>	Melnychuk, Alexa	<a href="mailto:melnychuk.alexa@ufl.edu">melnychuk.alexa@ufl.edu</a>
DeGuzman, Matthew	<a href="mailto:matthewdeguzman@ufl.edu">matthewdeguzman@ufl.edu</a>	Morales, Maria	<a href="mailto:m.morales@ufl.edu">m.morales@ufl.edu</a>
Duffaut, Alexander	<a href="mailto:aduffaut@ufl.edu">aduffaut@ufl.edu</a>	Osmanovic, Sara	<a href="mailto:s.osmanovic@ufl.edu">s.osmanovic@ufl.edu</a>
Escarcha, Lauren	<a href="mailto:laurenescarcha@ufl.edu">laurenescarcha@ufl.edu</a>	Patel, Amay	<a href="mailto:amay.patel@ufl.edu">amay.patel@ufl.edu</a>
Eum, Alex	<a href="mailto:alexeum@ufl.edu">alexeum@ufl.edu</a>	Temkin, Yair	<a href="mailto:ytemkin@ufl.edu">ytemkin@ufl.edu</a>
Grau Jr, Paul	<a href="mailto:pgrau@ufl.edu">pgrau@ufl.edu</a>	Tuli, Prayuj	<a href="mailto:ptuli@ufl.edu">ptuli@ufl.edu</a>
Hadam, Evan	<a href="mailto:ehadam@ufl.edu">ehadam@ufl.edu</a>	Webb, Zach	<a href="mailto:zwebb@ufl.edu">zwebb@ufl.edu</a>
Iamarino, Eric	<a href="mailto:eric.iamarino@ufl.edu">eric.iamarino@ufl.edu</a>		

### Course Description

This course covers algorithm development using pseudo languages, basic program structures, program design techniques, storage, and manipulation of basic data structures like arrays, stacks, queues, sorting and searching and string processing. Linked linear lists. Trees and multilinked structures. 3 Credit Hours.

### Course Pre-Requisites / Co-Requisites

(COP 3504 or COP 3503) and COT 3100 and (MAC 2234 or MAC 2312 or MAC 2512 or MAC 3473), all with a minimum grade of C.

### Course Objectives

By the end of the semester, students should be able to

- Choose and implement data structures for solving problems based on their functions and situational appropriateness of the application
- Choose an algorithm for solving a problem based on its computational complexity and appropriateness of the application
- Use an abstract data type to describe a data structure

### Professional Component (ABET)

This course is used to assess program outcomes for these ABET criteria:

- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

### Required Textbooks and Software

- Required Tools: Canvas, Slack, Gradescope, and Honorlock
- Optional Tools for practicing additional programming problems: Stepik and Edugator

### Recommended Materials (Optional)

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

### Course Schedule (Tentative)

Week	Dates		Topic	Deadlines
1	8-Jan	14-Jan	Course Introduction/ Algorithm Analysis	
2	15-Jan	21-Jan	List, Stacks, & Queues	Q <sub>1</sub> , Q <sub>2</sub>
3	22-Jan	28-Jan	Trees & Traversals	Q <sub>3</sub>
4	29-Jan	4-Feb	Balanced Trees 1	Q <sub>4</sub>
5	5-Feb	11-Feb	Balanced Trees 2	Q <sub>5a</sub>
6	12-Feb	18-Feb	Heaps & Priority Queues	Q <sub>5b</sub>
7	19-Feb	25-Feb	Sorting	P <sub>1</sub> , Q <sub>6</sub>
8	26-Feb	3-Mar	Exam 1 (March 1)	E <sub>1</sub>
9	4-Mar	10-Mar	Sets, Maps, & Hashing	P <sub>3a</sub>
10	11-Mar	17-Mar	Spring Break	
11	18-Mar	24-Mar	Graphs 1	Q <sub>7</sub>
12	25-Mar	31-Mar	Graphs 2	Q <sub>8</sub>
13	1-Apr	7-Apr	Greedy Algorithms	P <sub>2</sub> , Q <sub>9</sub>
14	8-Apr	14-Apr	Exam 2 (April 12)	E <sub>2</sub>
15	15-Apr	21-Apr	Dynamic Programming	Q <sub>10</sub>
16	22-Apr	24-Apr	Complexity Theory	P <sub>3b</sub>
<b>Legend:</b> Q <sub>N</sub> = Quiz N, P <sub>N</sub> = Project N, E <sub>N</sub> = Exam N <b>Note:</b> The instructor will be traveling for official work on Mar 20 and Mar 22 and these two lectures will be prerecorded.				

### Evaluation of Grades

Modality	Assignment	% of Final Grade
Individual	Programming / HTG Quizzes (drop two lowest scores)	12%
	Conceptual quizzes (drop two lowest scores)	10%
	Exam 1	20%
	Exam 2 (Cumulative)	20%

	Project 1	14%
	Project 2	10%
	Discussion participation activities	4%
Collaborative	Final Project (Individual or Group: 3a & 3b)	10%
Individual	Extra Credit Opportunities	Up to 3%
		<b>Total: 103%</b>

### Grading Policy

Percent	Grade	Grade Points
93.4 - 103	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33

Percent	Grade	Grade Points
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### Attendance Policy

1. Lectures will be offered in-person and through Zoom and they will be recorded. Students in the UDER and UFOL sections are supposed to watch prerecorded video lectures but are welcome to join live lectures via Zoom. Attendance is optional but highly encouraged.
2. Discussion attendance is mandatory for all sections except students in the UDER and UFOL sections as there will be graded activities in the discussion. If you do not attend the discussion, you will not be able to earn credit. UDER and UFOL sections can complete these activities offline.

### Course Communication, Office Hours, and Code Review Policy

3. **Use course slack or office hours for all course related communication.** For any personal communication such as accommodations request, you can use emails, but we will not answer course related questions such as debugging requests on email. **Note that we do not respond to Canvas messages as we prefer to keep all communications in one place.**
4. We typically answer queries on Slack within 48 business hours.
5. Students should visit the course staff during scheduled office hours for help on projects or quizzes. **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 discuss with the instructor **during their office hours**. Debugging requests to the instructor as a direct message on Slack or an email will be ignored if you do not follow the above protocol.
6. **Request for extensions on assessments:** 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:
  - A. **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 3 late days and/or have drops. 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.
  - B. **Forgetting** to turn in an assessment on time.
  - C. **File naming issues or feedback issues** on projects or programming quizzes. 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.

### ***Make-Up, Project Resubmission, and Late Submission Policy***

7. **No make-up or late submission** allowed on **quizzes or other participation extra credit opportunities**. Remember, you have drops and we open the quizzes for 4 days, so you have plenty of time in advance. **One of the drops is for you to use it in lieu of getting sick, forgetting to submit on time, or professional development (e.g., going to a conference). So don't ask for extensions as we will not be offering alternative assessments on these activities.**
8. Projects submitted late will be penalized by **10% each day for up to three days**. After the third day, you will get a 0. We also count weekends as regular days. So, if an assignment is due Friday, and you submit on Sunday, the max score you can get is 80 (2 days late penalty, 20% deduction).
9. No late submission allowed on Final Project (3a and 3b).
10. Projects 1 and 2 will have a hidden test suite which we will use for grading after your submission. If you score lower than 100 points on Project 1 or 2, you will have an opportunity to resubmit and get 50% credit back for each additional test case you pass in the suite. We will see the differences in your two submissions to make sure you aren't submitting an entirely new version of the code. *You are not eligible for resubmission if you do not pass at least three test cases in the first attempt.*
11. Exams may be made up when a student has an excused absence. These absences must be notified to the instructor at least 72 hours before the exam. Excused absences must be consistent with university policies in the catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require **appropriate documentation**. Please note that there is no guarantee that requests will be accommodated.

### ***Grade Review***

12. After one week of posting a grade, no revisions will be made. In the event of a grade review, the entire assignment will be reviewed, and your score can also decrease.
13. If there is an ambiguity on a quiz or exam question, you need to get back to the instructor within two hours of taking the quiz/exam to potentially get back points in case the ambiguity is genuine.
14. **We do not negotiate auto-graded components on assessments unless there is a typo such as a comma or a space.** Please do not contact us for partial credit on auto-graded questions. Missing values is not considered as a typo. **You get partial credit if you select one of the correct answers for auto-graded questions. You get negative partial credit if you select the wrong answer. This is deliberate. Otherwise, you will select every option and get full credit if there was no negative penalty.**

### ***Class Expectations***

15. Programming Quizzes are submitted on Gradescope; The course staff will not help with the coding logic for programming quizzes in office hours until the due date. We treat programming quizzes as exams but we can help with syntax if needed. You also have a buddy to work with and can ask for help on logic if stuck.
16. Exams and Conceptual quizzes will be on Honorlock.
17. For the exams, you can use C++ or pseudocode to describe your solution to a given problem.
18. C++ is the programming language that will be used throughout the course. You will be coding using C++14 in all quizzes and Projects 1 and 2. For the final project, you can use any language or multiple languages.
19. Strive for correctness, clean, readable, tested, and documented code throughout the course and not for optimization. Correctness and readability are the goals for this course. Once you have the correct solution then optimize if you want.
20. The course will not include Design patterns, Competitive programming, or Formal proofs. The instructor or the course staff will answer questions on the former topics contingent on their time or point you to additional resources. Feel free to post such questions on Slack channels. If any of your classmates do post such questions, don't feel intimidated and if you don't understand it, it is perfectly natural and fine. Some students are more experienced, and everyone should strive to improve their learning not comparing to others.

### ***Academic Dishonesty***

21. **Quizzes and Exams:**
  - You are **required** to work on conceptual quizzes, and exams **independently** without asking or searching for solutions on the web.
  - For **programming quizzes**, you can select a buddy and work together or can work on them individually. **If working together, both members should upload their solutions separately.** Note

that the person you select to work with, should remain the same for every programming quiz. You are allowed to collaborate with them at a conceptual level or you can pair program with them. Add a statement on line 1 of your code file stating the collaborator you worked with. If you work individually or as a pair, you must code the solution without asking or searching for solutions on the web. If your code as a group or as an individual, matches another group or an external solution, both members will be reported for violation of Honor Code.

- You are **allowed** to.
  - A. discuss solutions after the due date.
  - B. 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/>

22. **Project 1 and 2:**

- You are **required** to work on projects **independently** without asking or searching for solutions on the web.
- You are **allowed** to
  - A. discuss conceptually small sections in your project 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.
  - B. discuss solutions after the due date and late days have passed.
  - C. 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/>

23. **Project 3:**

- 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.

24. **Code policy for "individual" assessments – Project 1 and 2**

- 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.
- **Looking at any piece of external code, sharing files, searching for solutions found online, using AI-generated or -suggested code, or using someone else to code your solution is strictly prohibited.**
- Any student found to have violated these rules, whether a provider or receiver or unauthorized help, will be given a **zero** on that assignment **and** a **two-letter final grade decrement** for a first offense. For a second offense, you will get an E grade. Also, for both offenses, you will be reported to the Honor Court. **If you aren't clear on what constitutes plagiarism, ask the course staff.**

***Discussion and Slack Policy - Be Nice, Be Helpful***

- 25. Treat your classmates with civility and respect. Don't attack anyone and no discussion of controversial topics on channels.
- 26. If you have a question regarding code or content, always post it on the appropriate **Slack** channels if you want the course staff to answer. Do not be hesitant however simple is the question.
- 27. Use private message or email only if the message is related to personal requests. **Questions related to debugging on private messages will be ignored.**
- 28. Questions will be answered **Monday – Friday in less than 48 business hours typically** by at least one member of the course staff.
- 29. Try to answer questions posted by your course mates if possible and help them. This is helpful for a vibrant environment in a remote course.
- 30. Harassment/Bullying/Making fun of another student will not be tolerated and will lead to disciplinary actions. If someone is behaving disrespectfully on the forum which you find inappropriate, send the instructor a message and don't argue on it publicly.



### ***Students Requiring Accommodations***

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### ***In-Class Recording***

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session. Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Commitment to a Safe and Inclusive Learning Environment***

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University’s core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- HWCOC Human Resources, 352-392-0904, [student-support-hr@eng.ufl.edu](mailto:student-support-hr@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### **Software Use**

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### **Student Privacy**

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

### **Campus Resources:**

#### Health and Wellness

##### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

##### **Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

#### Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Connections Center**, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio**, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus:** <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

**On-Line Students Complaints:** <https://distance.ufl.edu/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.