

Data Structures and Algorithms

COP3530 Section 06D8 11187

Location: UF Online

Academic Term: Spring 2020

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Instructor:

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Course Description

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.

4 Credit Hours

Course Pre-Requisites

COP 3504 or COP 3503 with minimum grade of C, COT 3100, and MAC 2234, MAC 2312, MAC 3473 or MAC 3512.

Course Objectives

This course covers implementation and use of data structures for use in problem solving. In particular, lists, stacks, queues, trees, tables and graphs will be covered. Algorithm development including recursive techniques will be covered. Sorting algorithms will be covered. Students will learn to solve problems using data structures and choose how those data structures will be implemented.

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 application
- Choose an algorithm for solving a problem based on its computational complexity and appropriateness of application
- Use an abstract data type to describe a data structure

Materials and Supply Fees

N/A

Professional Component (ABET):

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

c) an ability to design hardware and software systems, components or

processes to meet desired needs within realistic constraints such as

economic, environmental, social, political, ethical, health and safety,

manufacturability, and sustainability

e) an ability to identify, formulate, and solve hardware and software

computer engineering problems, accounting for the interaction

between hardware and software

k) an ability to use the techniques, skills, and modern engineering tools

necessary for computer engineering practice

Required Textbooks and Software

- Data Structures and Algorithm Analysis in C++
- Mark Allen Weiss
- 4e, 2014
- 978-0-13-284737-7

Course Schedule

Week 1 (Jan 6): Computational Complexity and Algorithm Analysis, Recursion / Chapter 2 / Quiz 1

Week 2 (Jan 13): Lists, Stacks and Queues / Chapter 3/ Quiz 2

Week 3 (Jan 20): Trees, Tree Traversals, Binary Search Trees/Chapter 4.1-4.3

Week 4 (Jan 27): AVL Trees, Splay Trees, B-Trees, Red-Black Trees/Chapter 4.4-4.7, 12.2

Week 5 (Feb 4): Exam 1

Week 6 (Feb 11): Sets/Maps/Hash Tables/ Chapter 5 / Programming Project 1

Week 7 (Feb 18): Heaps and Priority Queues / Chapter 6

Week 8 (Feb 25): Sorting / Chapter 7

Week 9 (Mar 10): Graphs/Graph Implementation / Graph Traversals / Topological Sort / Chapter 9

Week 10 (Mar 17): Shortest Paths/Minimum Spanning Trees/Network Flow/Chapter 9

Week 10 (Mar 24): Exam 2

Week 11 (Apr 1): Greedy Algorithms / Chapter 10.1

Week 12 (Apr 8): Dynamic Programming / Chapter 10.3

Week 12 (Apr 15): NP Completeness / Chapter 9.7

Week 15 (Apr 22): Final Exam

Exams

Exams require the use of ProctorU.

[\(Links to an external](#) Exams may be made up when student has an excused absence.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance>) and require appropriate documentation.

Programming Assignments

Programming assignments require the use of C++. They will be compiled with g++ and your program must compile using this compiler.

Programming assignment grades include the use of data structures as taught in the class. The point of the class is to learn to make the best choices of data structures and algorithms, so choosing the most efficient data structures will be part of an assignment grade. Rubrics are not a step by step guide to getting 100% on the assignment, and passing all test cases does not mean you get 100% on the assignment.

Programming Assignments may be turned in late with a penalty of 10% per day up to 4 days late.

University Honesty Policy

You may work together but your code must be your own. Working together on an algorithm is OK, copying and pasting code from each other or the internet or anywhere else is not.

We will be checking your code using MOSS (measure of software similarity). If you're thinking of turning in code you didn't write, just don't. You don't learn that way, and isn't learning why you're here?

Do not store your code in a publicly accessible github.

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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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 TA in this class.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Programming Assignments (2)	100 each	30%
Sorting Analysis	100	10%

Quizzes (9)	20 each	10%
Exams (2)	100 each	30%
Final Exam	100	20%
		100%

Grading Policy

Percent	Grade	Grade Points
93 - 100	A	4.00
90.0 - 92.9	A-	3.67
87 - 89.9	B+	3.33
83 - 86.9	B	3.00
80.0 - 83	B-	2.67
77 - 79.9	C+	2.33
73 - 76.9	C	2.00
70.0 - 72.9	C-	1.67
67 - 69.9	D+	1.33
63 - 67	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

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

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://gatorevals.aa.ufl.edu/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open.

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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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>