

Computer Science 112

Fundamentals of Programming 2

Instructor:

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Webpages:

- For submitting labs, exams, and grades: canvas.wlu.edu
- For lecture notes and lab descriptions:
<https://github.com/geofmatthews/csci112>
If you don't know how to use git, just go to that website, click the `Code` button, and then `Download ZIP`. This does just what it says.
- For software: <https://www.python.org/> This software is installed in the labs, but you may want to download it for your own computer. It's free.

Class lectures: MWF 2:45-3:45, Parmly 405

Lectures are in-person and attendance is required. If you must miss a lecture, inform your instructor before the day you must miss and arrange to get notes from another classmate. Office hours will be used to answer questions, but material already presented in class will not be reviewed.

Labs: Thursday 1:30-4:30, Parmly 405

Labs are in-person and attendance is required. No new material will be presented in labs, but it is a unique opportunity to work on the homework with direct assistance from the instructor and the TAs. If you miss a lab, you will have to make the time up yourself, and it will likely take you longer.

Office hours: MWF 1:15-2:15 , Parmly 407A

If you need to see me but cannot make these hours, please make an appointment.

Overview: This is the second introductory course in programming and problem solving. Topics include:

- An introduction to **algorithm analysis**, the mathematical study of fundamental properties of computer programs.
- **Linear data structures**, including lists, stacks, queues and deques and their applications.
- **Sorting algorithms**, including $O(n^2)$ sorts such as bubble sort, selection sort, and insertion sort, $O(n \log n)$ sorts such as merge sort and quick sort, and possibly some in between, such as shell sort.
- **Hashing** including both open and closed implementations of collision resolution.

- **Tree data structures**, basic algorithms and a sampling of their applications. Topics may include: parse trees, priority queues, heaps, binary search trees, and balanced binary search trees.
- **Graph data structures** basic algorithms such as topological sorting, strongly connected components, search algorithms such as Dijkstra's and A^* , and spanning tree algorithms.

Textbook: *Problem Solving with Algorithms and Data Structures Using Python*, by Miller and Rahum.

This book is available for free online. It is also available in the bookstore and at amazon.com for those who would prefer a paper copy. The online and paper editions have slight differences, but either one should be fine.

There are many other online resources for studying data structures, feel free to use as many as you think helpful!

Labs: Labs are on Thursdays. Each lab will be due the following Tuesday before midnight. There will be no late work accepted. There will be 11 labs, each worth a maximum of 5 points. Your worst lab score will be thrown out. Points will be awarded according to the following.

Factors to consider:	Points
Outstanding work. Well formatted, modular, well commented, well designed. Clear, self-documenting identifiers: variables, functions, class names. Good, consistent docstrings. Extra work on optional problems or extensions of the required work. Error checking. Comprehensive unit tests. Innovative solutions. Extensive documentation on design decisions and results.	5
Good work. The problem is solved completely and without errors. Adequate documentation.	4
Adequate work. Most, but not all of the problem is solved. Poor documentation.	3
Incomplete work. Some progress was made, but no complete solution. Nonexistent documentation.	2
Poor work. Little or none of the problem is solved. Random bits of code copied from lectures or the problem description without showing any real coherence or understanding of an approach to the problem.	1
Unacceptable work. Syntax errors. Not turned in on time. Did not follow instructions.	0

Assessment survey: The first lab also includes filling out the Assurance of Learning Survey for CSCI Majors. Completing this survey is **required** to pass this course.

Your answers on this survey will not affect your grade in any of your courses. By filling out this survey now and after you complete the requirements for the CSCI major or minor, you will help us assess how well we are reaching our departmental learning goals.

At this point we do not expect you to know the answers to most of these questions; we, therefore, encourage you to skip questions about material that you haven't yet studied.

The survey can be found on canvas under assignments.

Midterms: There will be two midterms, each worth 10%, as in the class schedule below. It is open book and open notes, but you may not consult with any classmates or the internet or other resources.

Final exam: The final exam is comprehensive. It is open book and open notes, but you may not consult with any classmates or the internet or other resources.

Grades: Possible points:

Labs	Exams		
	Midterm 1	Midterm 2	Final
50	10	10	30

Grades will be based on the following percentages out of all possible points:

$$A \geq 90\% > B \geq 80\% > C \geq 70\% > D \geq 60\% > F$$

The instructor reserves the right to adjust the scale, but only in a manner that would reward higher grades than those predicted from the table. Awarding \pm is also at the discretion of the instructor.

Computer use in class: The use of laptops and mobile computing devices are permitted during class so long as they are being used for the course such as for taking notes and locating information related to the course. These devices are not to be used during class for texting, phone calls, reading email, social networking, completing assignments for other courses, shopping, or any other topic unrelated to the class you are currently attending.

Accommodations Washington and Lee University makes reasonable academic accommodations for qualified students with disabilities. All undergraduate accommodations must be approved through the Office of the Dean of the College. Students requesting accommodations for this course should present an official accommodation letter within the first two weeks of the (fall or winter) term and schedule a meeting outside of class time to discuss accommodations. It is the student's responsibility to present this paperwork in a timely fashion and to follow up about accommodation arrangements. Accommodations for test-taking should be arranged with the professor at least a week before the date of the test or exam.

Academic dishonesty: Please review the university's honor system, and the definition of plagiarism which can be found at

<https://my.wlu.edu/executive-committee/the-honor-system>

Unless specified otherwise, all work for this course is meant to be done **individually**. The work that you turn in for a grade must be completely your own, or you will be guilty of academic dishonesty.

Nevertheless, it is a valuable learning experience to discuss work with your fellow students, and this is encouraged. However, after working with a colleague, **you may not keep any paper or electronic copies of anything you produced together!** You may only keep your memories. In particular, this means that **you may not ask for or give help while sitting in front of a computer where the assignment is open!** Also, **you may not use anything a colleague has emailed to you!** Delete the email and do not save a copy.

To help understand what I mean, remember the

Long Term Memory Rule

You may discuss, sketch, write things down, use your computers, whatever, but after you are done working with your fellow students all files must be deleted, whiteboards erased, and all papers you created must be destroyed. You should then watch a rerun of *the Simpson's*, play a game of ping-pong, take a walk, or something else for half an hour. After this you can go back to your assignment (alone) and use the knowledge you have now gained.

We are here to help you get a great education. Please do not put us in a situation where we have to police you for plagiarism. We hate that.

Schedule:

January 2023							
Su	Mo	Tu	We	Th	Fr	Sa	
8	9	10	11	12	13	14	Python review, Algorithm analysis
15	16	17	18	19	20	21	Linear data structures
22	23	24	25	26	27	28	Recursion
29	30	31					Review & Midterm 1
February 2023							
Su	Mo	Tu	We	Th	Fr	Sa	
			1	2	3	4	Review & Exam
5	6	7	8	9	10	11	Searching, Sorting
12	13	14	15	16	17	18	Trees
19	20	21	22	23	24	25	Holiday
26	27	28					Trees
March 2023							
Su	Mo	Tu	We	Th	Fr	Sa	
			1	2	3	4	Trees
5	6	7	8	9	10	11	Review & Midterm 2
12	13	14	15	16	17	18	Graphs
19	20	21	22	23	24	25	Graphs
26	27	28	29	30	31		Misc. topics
April 2023							
Su	Mo	Tu	We	Th	Fr	Sa	
						1	
2	3	4	5	6	7	8	Review
9	10	11	12	13	14	15	Final exam