CSC 252/254: Data Structures
252 – 2 units   254 – 4 units
Fall 2018

Point Loma Nazarene University
College of Natural and Social Sciences

PLNU Mission
Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Instructor:
>Dr. Benjamin Mood
>bmood@pointloma.edu
>619 849 2269
>Trailer #2

Meeting Times and Locations:
>**Lecture:**
>>M/W/F: 12:15PM – 1:10PM   LA 02
>
>**Lab:**
>>R: 7:25AM – 9:10AM   Library West 220 (Breese lab)

Office Hours:
>M: 6:45 – 7:15am (caf), 8:30am – 9:30am, 10:30am – 12:00pm
>T: 1:45pm – 2:45pm
>W: 6:45 – 7:15am (caf), 11:15-12pm (caf)
>R: 6:45 – 7:15am (caf), 9:30am – 10:30am, 12:30pm – 2:45pm
>F: none

Books:
>**CSC252/254:** *C++ for Java Programmers* by Mark Allen Weiss
>**CSC254:** *Data Structures and Algorithm Analysis in C++* by Mark Allen Weiss

Course Description:

CSC254

Standard data structures, including queues, stacks, trees, and graphs, as objects are defined and illustrated with associated dynamic storage management mechanisms. Introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include measuring the complexity of recursive and iterative algorithms, algorithmic strategies, the concept of intractability and the theory of NP. Emphasis

is placed on non-numerical algorithms such as sorting, searching, graph and network algorithms both sequential and parallel. Concepts are reinforced through weekly programming assignments. Lecture three hours and laboratory two hours each week.

CSC252
Students transition to the C++ language and are introduced to additional data structures, including queues, stacks, trees, and graphs considering their implementation with both arrays and linked lists. Concepts are reinforced through weekly programming assignments. Lecture three hours and laboratory two hours each week (this is a quad class). Annually CSC252 is the first quad of CSC254.

Learning Outcomes:

CSC252
Students will be able to write correct and robust software.
Students will analyze the interaction between hardware and software.
Students will be able to apply their technical knowledge to solve problems.
Students will be able to speak about their work with precision, clarity and organization.
Students will be able to write about their work with precision, clarity and organization.
Students will collaborate effectively in teams.
Students will be able to gather relevant information, examine information and form a conclusion based on that information.
Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats.

CSC254
Students will be able to write correct and robust software.
Students will use the theory of algorithms and computation to solve problems.
Students will analyze the interaction between hardware and software.
Students will be able to apply their technical knowledge to solve problems.
Students will be able to speak about their work with precision, clarity and organization.
Students will be able to write about their work with precision, clarity and organization.
Students will collaborate effectively in teams.
Students will be able to gather relevant information, examine information and form a conclusion based on that information.
Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats.

Department Mission:

The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

Additional Course Information:

    Lectures: Readings should be done before the lectures so students have an opportunity to think

about any questions they will want to ask in class.

Missed Classes: Labs missed due to PLNU activities (i.e., sports teams, choirs, etc), should be turned in the next lab the student is back. Missed Exams must be scheduled before the student leaves (exception is dire circumstances). It is the student's responsibility to inform the professor of when they will be gone. In-class work will be waived for excused events.

Expected time: As this is a 4-unit class (or two units over 7 1/2 week), it is possible you may spend up to 12 - 16 hours outside of class on this material. (In case you are wondering, a rule of thumb is you can expect to spend 3 - 4 hours per week per 1 in-class hour).

Labs: Labs are used to give students a way to practice the concepts studied in lecture. They will be composed of a practical and a theoretical (written) section. The practical part of the lab must be demonstrated to Dr. Mood or a lab assistant to show that it works successfully. A completed lab includes the signed off practical sections and answers to the theoretical questions on paper AND all code turned in <u>online</u> on canvas. <u>It should be well commented with meaningful variable and function names. Code missing comments or code with poor names will not be given full credit.</u>

During the week, there is 1 lab period and 2 extra lab times where a lab assistant will be available to answer questions or sign off on the lab. Students may also come by Dr. Mood's office hours to ask questions and/or request their lab to be signed off.

Labs should be turned by the start of the next lab (~7:40am). I am not planning on accepting late labs. Partial credit will be given, so please turn in whatever is done.

Cheating: You should not copy another student's work. If you use online resources, you must site the direct URLs in the labs you turn in. You should not copy code from online (exception: looking up how to call functions or use built-in classes.). Unless otherwise noted, talking and working with fellow students to understand concepts is OK, but simply getting code you do not understand is not OK. If you are concerned, simply ask myself or the lab assistant for help.

Rule of thumb: everything you turn in you should be able to completely explain. Meaning, if I call you into my office to explain your work, you should be able too. Otherwise, you risk receiving a 0 on the assignment.

Final: The final time is **Weds @ 10:30am.**

Cell Phones & Laptops: Please don't use them in class unless we are doing a demonstration or asked to use them. An occasional peek is OK, but ignoring what is going on in class is not.

Be Courteous and Respectful. Be respectful to me. Be respectful of each other. It is highly distracting to me to see someone doing something else while in my class. This includes things like listening to music during my lecture. Do not do work for any other class inside of this one. Students violating the above rules may be asked to leave class for the day and will receive a 0 for all in class work.

Project: CSC254 students will do a project that involves at least 1 data structure. Up to two people way work together on a project, but teams with two people are expected to do more work than

teams of one person. Ideas: a card game (involving stacks / queues), a database program. More ambitious ideas: 3D (OpenGL) project, text traffic simulation. The students will turn in the project code <u>and instructions on how to run the project</u>.

Grading:

Grades are based on the number of points accumulated throughout the course with the following exception. A student must pass at least a programming exam or a written exam in order to pass the class. That is, a score of 60% must be achieved on one of the examinations, or else the final grade will be an F regardless of all other point totals.

	CSC254	CSC252
Labs	20%	35%
Programming Exams	35%	30%
Midterm/CSC252 Final	15%	35%
Project	10%	----
Final	20%	----

Grading scale
93 – 100%	A
90 – 92%	A-
87 – 89%	B+
83 – 86%	B
80 – 82%	B-
77 – 79%	C+
73 – 76%	C
70 – 72%	C-
67 – 69%	D+
63 – 67%	D
60 – 62%	D-
0 – 59%	F

PLNU Policies

Attendance:
Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day.

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See the Undergraduate Academic Catalog <u>Class Attendance</u>.

Class Enrollment:
It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Academic Accommodations:
While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

Academic Honesty:
Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Honesty for definitions of kinds of academic dishonesty and for further policy information.

Final Exam: Wednesday of finals week @ 10:30am
The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

Copyright Protected Materials:
Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

Credit Hour:
In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 4-unit class delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Schedule - Schedule is approximate. Due dates & tests will not change, but what is covered on any particular day might.

Monday	Tuesday	Wednesday	Thu	Friday
Aug: 27	28: Class Intro Chapter 0. Interview.	29: Chapter 1	30: Lab: Visual Studio & First Programs	31: Chapter 2
Sep 3 (No Class) Labor Day	4	5: Chapter 2, in class 2d arrays examples (nested loops)	6 Lab: Functions, Parameters, Arrays, vectors, Strings	7 In class programming & Bitwise Operations
10 Pointers Chapter 3	11	12 Pointers Chapter 3	13 Lab: "Fun" with Pointers	14 How to debug day
17 What is an algorithm?	18	19 Classes Chapter 4	20 Class lab	21 Classes Chapter 4
24 Classes Chapter 4	25	26 Operator Overloading Chapter 5	27 Lab: More fun with pointers (classes)	28 Practice solving problems
Oct: 1 Inheritance Chapter 6	2	3 Inheritance Chapter 6 / Casting	4 Lab: Inheritance	5 Casting / Templates (Chapter 7)
8 STL Containers Chapter 10	9	10 STL Algorithms 10.8-10.11	11 **Programming Exam I**	12 File IO Chapter 9 & next section
15 **CSC254 Midterm / CSC252 Final**	16 End of Quad I	17 Algorithms Intro / How to use book / different datastructures /Chapter 2	18 Remind lecture: STL Lab: STL Containers & Templates (Maps)	19 (No Class) Fall Break
22 DS Chapter 2 Amortization	23	24 Review: Stacks & Queues	25 Stack & Queue PTR lab	26 Trees DS Chapter 4 **Project idea submission**

29 Trees DS Chapter 4 **Project Idea return**	30	31 Trees DS Chapter 4	Nov: 1 Tree drawing lab	2 Trees DS Chapter 4
5 Hashing DS Chapter 5	6	7 Hashing DS Chapter 5	8 Hashing Lab	9 DS Chapter 7, Insertion sort,
12 DS Chapter 7, Merge sort/ Quick sort	13	14 DS Chapter 7, Bucket Sort, Radix sort	15 Sorting Lab	16 Graphs DS Chapter 9
19 DS Chapter 9	20	21 (No Class) Thanksgiving	22 (No Class) Thanksgiving	23 (No Class) Thanksgiving
26 DS Chapter 9	27	28 DS Chapter 9	29 Graphs Lab	30 DS Chapter 9
Dec: 3 DS Chapter 9	4	5 **Project Presentations / Project Due**	6 **Programming Exam II**	7 Review Day!
10	11	12 **Final! @10:30**	13	14