CSCI 2421: Data Structures and Program Design
Course Syllabus
Spring, 2018, M/W 2:pm-3:15pm, Science 1111

Instructor: Dr. Tom Augustine
Email: thomas.augustine@ucdenver.edu
Phone: (303) 315-0070
Office: Lawrence 802
Office Hours: posted on Canvas or by Appointment

Catalog Data: Topics include a first look at an algorithm, data structures, abstract data types, and basic techniques such as sorting, searching, and recursion. Programming exercises are assigned through the semester.
Co-requisites: CSCI 2312
Prerequisites: CSCI 1410 and CSCI 1411

Note: ***Each student must sign the Prerequisites Agreement form to receive any credit for any assignment or exam. If this form is not returned by the 1st week, the student will be administratively dropped from the course.***

Expected Knowledge at the Start of the Course: Basic understanding of object-oriented programming in C++.
File I/O and stream process.
Dynamic classes and value semantics.

Expected Knowledge Gained at the end of the Course:
Solid understanding in specifying, designing and implementing common data structures.
Container classes and linked list., Standard Template Library, Stack and queue, Trees., Hashing, Sorting

ABET Assessment Criteria:

(b) An ability to analyze a problem, and identify and define the computing requirements to its solution (PEO #1) - Assigned for Assessment
(c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs (PEO #1)
(i) An ability to use current techniques, skills, and tools necessary for computing practice. (PEO #1, PEO #2)

Textbook: Data Abstraction & Problem Solving (Walls and Mirrors) 7th Edition, Carrano and Henry, 978-0-13-446397-1

Course Schedule: The following is the tentative schedule for this course and it is subject to change. That being said, I will try my best to keep to it. Any changes will be reflected on this course's Canvas page.

Week	**Date**	**Topic**	**Reading**	**Assignment (*ABET Requirement*)**
1	Wed 01/17	Data Abstraction ADT and C++ Classes	Chapter 1	
	Mon 01/22	Functions, Constructors, Namespaces Operator Overloading	C6.1 C6.2	Pre-req Exam due
2	Wed 01/24			
	Mon 01/29	Algorithm Efficiency	Chapter 10	Homework 1 Due
3	Wed 01/31	Recursion	Chapter 2	
	Mon 02/05			Homework 2 Due (Container)
4	Wed 02/07	Dynamic Array / Vector Implementations	Chapter 3	
	Mon 02/12	Standard Template Library Vector, List Standard Template Library Iterators	Chapter 8 Chapter 9 C7.1 - C7.2	Homework 3 Due (Recursion)
5	Wed 02/14	Sorting Algorithms and Efficiency	Chapter 11	
	Mon 02/19	Linked lists and linked list node	Chapter 4	Homework 4 Due (Pointers)
6	Wed 02/21			
	Mon 02/26	Double Linked Lists		Homework 5 Due (LL)
7	Wed 02/28			
	Mon 03/05	Stacks	Chapter 6 Chapter 7	Homework 6 Due (DLL List STL)
8	Wed 03/07	Queues	Chapter 13	
	Mon 03/12	Practical Uses of Stacks, Queues	Chapter 14	
9	Wed 03/14	Trees / Binary Search Trees	Chapter 15	
	03/19- 03/23	**Spring Break**		
10	Mon 03/26	Final Project Review		Homework 7 Due (Stacks and Queues)
	Wed 03/28	Tree Implementation	Chapter 16	
11	Mon 04/02	Heaps STL Priority Queue and Heap	Chapter 17	
	Wed	Hashing	Chapter 18	

	04/04			
12	Mon 04/09	Hashing		Homework 8 Due (Project Outline)
	Wed 04/11	Balanced Search Trees AVL – Trees / Red Black Trees STL Map and Multimap class	Chapter 19	
13	Mon 04/16			Homework 9 Due (Hashing) Homework 9A Due (Trees on Paper)
	Wed 04/18	Graphs	Chapter 20	
14	Mon 04/23	Graphs		
	Wed 04/25	Smart/Managed Pointers	C.4	
15	Mon 04/30	Java and Python Data Structure Implementations		Final Project Due
	Wed 05/02	Exam Review		
	05/07-05/12	**Final Exam during Exam Week**		

EVALUATION:

I. **Course Grade:** Course grades are a weighted average of the grades earned on all graded material. The weights for the different categories are:

- Homework...55%
- Final Project 20%
- Exam: 20%
- Attendance/Participation:.....................................5%

Letter Grades are as follows:

- 94% – 100% .... A
- 90% – 93.9%........ A-
- 87% – 89.9%........ B+
- 84% – 86.9% .... B
- 80% – 83.9%........ B-
- 77% – 79.9%........ C+
- 74% – 76.9% C
- 70% – 73.9%........ C-
- 67% – 69.9%........ D+
- 64% – 66.9% .... D
- 60% – 63.9%........ D-
- 00% – 59.9% .... F

Homework/Programming Assignments: The homework for this course will be submitted on Canvas usually at midnight on the due date. The Programming Assignments will be in the C++ programming language. The grading of the Programming Assignments is a combination of completeness (all specifications are covered), correctness of results, and style. I do not allow late work to be submitted unless there is **prior approval** by me based on **special circumstances.** The top 8 of 9 scores will count toward your Homework grade, but you are expected to complete ALL homeworks.

Exam: There will be one final exam that will be taken at home during Exam week. You will be allowed to bring in one page (both sides) of handwritten notes.

Grade Dissemination: I will be using the Canvas system to record your grades. You can check on Canvas for all of your current grades.

COURSE PROCEDURES:

I. **Attendance:** Attendance is required for this course. As with all science courses, you will have an easier time learning the material if you attend the lectures and participate in class.

II. **Email Policy:** I will be using both the University email system and the Canvas email system. Please use the Canvas email system for course related questions.

III. **Classroom Devices:** Out of respect for everyone in the classroom, if you would like to record the lectures you must first receive my approval. I generally will approve the request, but I first would like to speak with you concerning the scope of the recording.

STUDENT EXPECTATIONS:

I. **Civility:** My commitment is to create a climate for learning characterized by respect for each other and the contributions each person makes to class. I ask that you make a similar commitment.

II. **Professionalism:** Since mobile devices can be a distraction during class, I ask that all devices be put into "silent" mode and not utilized during class; this includes checking Facebook, sending a Tweet, or checking email. If I feel that your mobile device is becoming a distraction for either other students, you, or myself I will ask you to leave the classroom.

COLLABORATION AND CHEATING:

I encourage you to review material and discuss ideas together for projects and other assignments, and to work on problems you encounter. It is a characteristic of computing that discussions often help to clarify problems and resolve difficulties — feel free to take advantage of this to improve your understanding of the material, and to complete projects, but **make sure you then create your own work**. It's important that you go through the program design, coding, and debugging processes yourself, or you will not be developing your own programming skills and understanding. "Working together" does not mean that one student does the majority of the work and other students put their names on it! If you have any questions about what this means, please see me. **Every student must create their own work on their own!**

Any instances of cheating will result in either a zero for the assignment, a grade of zero in the course, or sanctions determined by the college (including suspension and expulsion).