DVC

COMSC-210 – DATA STRUCTURES AND ALGORITHMS (C++)
Fall 2018 Syllabus, Section #3156
Online @ Canvas: https://dvc.instructure.com/courses/33491

PLEASE READ THIS SYLLABUS THOROUGHLY, PRINT IT OUT AND KEEP IT.
IT CONTAINS VERY IMPORTANT COURSE INFORMATION.

CONTACT INFORMATION

Professor: Nick Amato
Email: namato@dvc.edu
My Office: FO-225
Office hours: M, W, Th: 2:30pm – 4:00pm
                    Online: Tuesday 11am – 12pm

CATALOG DESCRIPTION

This course presents techniques relevant to program design and selection of data structures for larger programs. Topics include design techniques, effective use of recursion, algorithmic efficiency and O-notation, linked lists, binary trees, B-trees, graphs, sorting and searching techniques. Extensive programming of a variety of data structures is practiced. C-ID COMP 132, CSU, UC. 4 credit units.

Prerequisites: COMSC-165 or equivalent
Recommended prerequisites: COMSC-200 or equivalent

Course meeting times:

Section 3156:

      Monday: 11:10am – 12:35pm, ATC 115
                  12:35pm – 2:15pm, ATC 115

      Wednesday: 11:10am – 12:35pm, ATC 115
   12:35pm – 2:15pm, ATC 115

STUDENT LEARNING OUTCOMES

•   Apply a variety of data structure and program design techniques.

•   Analyze, evaluate, and compare data structures for appropriateness in programs. Structures covered include: singly and doubly linked lists, arrays, binary trees, graphs, stacks, queues, B-Trees, and hash tables.

•   Implement a variety of data structures. Some programs may require 1500-2500 lines.

•   Use recursion effectively.

- Use Big O-notation.

- Apply some of the basic ideas and procedures of software engineering.

- Apply the basic data structures, iterators, and algorithms of the C++ STL.

COURSE TEXTBOOK and SOFTWARE

Textbook

The **required** textbook is the following book:
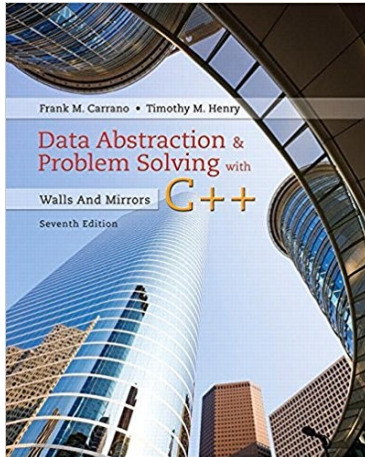
Carrano, Frank and Henry, Timothy. *Data Abstraction and Problem Solving with C++, Seventh Edition*
ISBN-10 0-13-446397-8
ISBN-13 978-0-13-446397-1

Required Software

To complete the assignments, you will need to access an Integrated Development Environment (IDE). Use one of the following options:

Option 1 (recommended) – Code::Blocks: I recommend using **Code::Blocks** which is available on the DVC lab computers as well as via free download for Windows, macOS and Linux.
Download via: http://www.codeblocks.org/downloads

Option 2 – Visual Studio Code – This is a newer code editor from Microsoft that can be made into an IDE with a few additional plugins. It has a free download for Windows, macOS and Linux. Some additional steps are required to get it running smoothly which you may not want to undertake if this is your first experience with an IDE. I will post instructions on the course Canvas site.
Download via: https://code.visualstudio.com/download

You are free to use any development environment that suits you, however, I can only provide support for these two packages.

COURSE ASSIGNMENTS and EXAMS

There are **12 lab assignments**, **5 quizzes**, **a midterm exam**, and **a final exam** that will determine your grade in this course. These assignments serve to reinforce your learning and will generally cover material presented in the previous week. The midterm will cover approximately the first half of the course and final will cover approximately the second half.

Each week (with a few exceptions) we will cover one chapter of the book, and there will be a quiz on that chapter in the following week. **The lab assignment will be due on the Sunday evening by midnight of the week it is assigned.**

Quizzes will be given during the lab sections on **Wednesdays**.

CLASS POLICIES

General

The course schedule in this syllabus constructed to give you a general layout of the course and week-by-week topics and materials that are due. To be successful, i**t is critical that you do not fall behind** as each topic tends to build upon prior ones as we continue into more complex material.

Expect to spend 12-15 hours per week on reading, lab assignments, and quiz/exam review. To maximize your time investment, it is important to read/skim each chapter before coming to class that week so you have an understanding of what is covered.

All quizzes will be **delivered in the lab section** of the course, via Canvas.

The **Canvas discussion board** is a useful tool to ask questions and discuss material in the course. Use it as your first choice for asking questions on assignments and coursework.

Attendance

Please sign-in to the attendance sheet at the beginning of the class. Attended will not be used for grading, but you may be dropped from the class if you miss too many classes in accordance with DVC policy. If you need to stop attending class, it is your responsibility to contact the admissions office and withdraw, otherwise policy states that I must give an 'F' to any students who are still on the final class roster and have not dropped.

Quizzes and exams cannot be made-up after they occur. If you have a conflict with an upcoming exam or quiz please contact me in advance.

Incompletes

The "incomplete" grade was designed for students who have a last minute "disastrous" event (serious illness, death in the family) that prevents them from completing the course. A student must be passing prior to the "disaster", must have more than 50 percent of the work completed, and evidence of the "disaster" must be supplied to the instructor. The instructor has sole discretion of whether to issue the incomplete. Incompletes are rarely given and do require a contract between the student and instructor about what work is to be made up and the time limit in which it is to be finished.

GRADING

Your grade will depend on your scores in multiple types of activities:

(5) Chapter Review Quizzes will be given approximately every *other* week (see the schedule) covering the material from the prior 1-2 weeks. Each quiz is worth 20 points, for a total of 80 points possible – **the lowest quiz score will be dropped** from the cumulative point total (i.e. 20 points * 4 quizzes counted == 80 points max). Your quiz score will count for 20% of your final grade.

(12) Lab Assignments are programming assignments that will be given approximately every week, enabling you to "learn by doing" and put into practice the material you learn in the lecture and readings. **The lowest lab score will be dropped**. Each lab assignment is worth 20 points, for a total of 220 points possible (i.e. 20 points * 11 labs counted == 220 points max). Your lab assignment scores will count for 50% of your final grade.

A midterm and final exam are given at approximately the midpoint of the semester, and end of the semester, respectively. The exams are 100 points each, for a total of 200 points possible. The midterm will count for 15% of your final grade, and the final exam 15%.

Extra credit is not available in this course.

HOW CAN I FIGURE OUT MY GRADE?

Component of Grade		Grade Worksheet		
Item	% of grade	Your %	Multiply by	= Total
1. Chapter Review Quizzes (drop 1)	20%		0.2	
2. Lab Assignments (drop 1)	50%		0.5	
3. Midterm	15%		0.15	
4. Final	15%		0.15	
TOTAL	100%	**Add final column GRAND TOTAL =**		

Multiply the lower right cell by 100 to get your percentage, then use:

Grading Letter Scale
90-100% = A
80-89% = B
70-79% = C
60-69% = D;
59% and below = No F's please
Pass = 70% or higher; No Pass = 69.9% or lower

Please maintain your grades and keep your assignments. The Federal FERPA Act prohibits sending grades via text message, email or phone.

DUE DATES: SUBMIT EARLY!

The lab assignment will be due on the Sunday evening by midnight of the week it is assigned. You may submit the assignment any time leading up to that point and/or resubmit as

needed, but not after the date has passed. Assignments submitted 1 or more due days after the date will be graded with -1 point per day. **I will not accept assignments that are submitted more than 14 calendar days after the due date.**

Examples:

> Alice submits her lab in Canvas at 2:00pm on Wednesday the 12th when it was due on Sunday the 9th. The final score will be penalized 3 points because it is 3 calendar days late.

> Bob realizes on the Monday the 24th that his lab was due on Sunday the 9th, and rushes to turn it in quickly that day. The lab is not accepted (a zero is given) because it is 15 calendar days late.

I will try to remind you of due dates, but **submitting on time is your responsibility**. I encourage you to not wait until the last minute to upload your assignment and to account for any unexpected things that may happen.

OTHER POLICIES

Cheating & Plagiarism Policy

Don't do it. Do you really want to have faked your way through the class?
The DVC Academic Integrity policy is located here:
https://www.dvc.edu/communication/policies/student-rights/academic-integrity.html

Student Code of Conduct Policy

The Student Code of Conduct policy is located here:
https://www.dvc.edu/communication/policies/student-rights/code-of-conduct.html

Student Privacy Rights Policy

The Family Educational Rights and Privacy Act (FERPA) is a law that protects students from having their education records shared with people without the student giving their advance approval in writing. (Education records include such things as grades, information from counseling appointments, academic standing, disciplinary records, to name a few.) FERPA also gives students the right to see their education records. If there is inaccurate or misleading information in their records, students can challenge it and try to get it changed. Under FERPA, colleges must have students' written permission to let parents, guardians, spouses, or others see or discuss their educational records, even if the student is present.

The Students Privacy Rights policy is located here:
https://www.dvc.edu/communication/policies/student-rights/privacy.html

Accommodations for Students with Disabilities

If you have a documented disability and wish to discuss academic accommodations, or if you would need assistance in the event of an emergency, please contact me as soon as possible.

DSS Statement:

"Any student with a documented disability is welcome to contact us as early in the semester as possible so that we may arrange reasonable accommodations. As part of this process, please be in touch with Disability Support Services office at Student Services Center Room 240 or call: 925-969-2176

For information related to DVC Disabled Student Services go to:
http://www.dvc.edu/studentservices/dss/dss-student-handbook/index.html

Online Behavior

Please do not behave in a manner that is disruptive or disrespectful to you, your classmates, or your professor. Students who are disruptive will receive one written warning—if you do not improve after receiving this warning, expect to be dismissed from the course.

CLASS COMMUNICATIONS

The best way to contact me is via email at namato@dvc.edu or use the Remind app (see the code to use at the top of this syllabus).

For questions about the class material I encourage you to use the Canvas discussion area – if you're stuck on something, chances are some of your classmates are too!

COURSE SCHEDULE, QUIZ AND EXAM DATES

Subject to change according to DVC Policy

Calendar Week	Topic(s)	Item(s) Due
Week 1 (8/27)	**Course introduction / Chapter 1, C++ Review** • Software, tools and preparing for the course • Chapter 1, review C++ and OOP concepts	Lab Assignment #0 (not graded)
Week 2 (9/3)	**Chapter 1 (cont.), Chapter 2** • **No class Monday, 9/3 (Labor Day)** • Recursion introduction	
Week 3 (9/10)	**Chapter 5** • Solving problems with recursion • Examples of recursive algorithms	Lab Assignment #1 Chapters 1,2 Quiz
Week 4 (9/17)	**Chapter 6** • Introduction to stacks	Lab Assignment #2
Week 5 (9/24)	**Chapter 6** • Examples of stacks in practice	Lab Assignment #3 Chapters 5,6 Quiz

Week 6 (10/1)	**Chapter 10** • Big-O notation • Analysis of efficiency	Lab Assignment #4
Week 7 (10/8)	**Chapter 11** • Introduction to sorting algorithms • Merge sort and quicksort	Lab Assignment #5 Chapter 10 Quiz
Week 8 (10/15)	**Chapter 17** • Introduction to heaps • Heap sort	Lab Assignment #6
Week 9 (10/22)	**Midterm exam review** • (Monday) Review and recap prior chapters • (Wednesday) Exam	**MIDTERM EXAM** **Wednesday 10/24** Chapters: 1, 2, 5, 6, 10, 11, 17
Week 10 (10/29)	**Chapters 15, 16** • Trees: types, structure and terminology • Binary search trees	Lab Assignment #7
Week 11 (11/5)	**Chapter 19** • Balanced search trees • Red/Black trees	Lab Assignment #8 Chapter 15, 16, 19 Quiz
Week 12 (11/12)	**Chapter 19 (cont.)** • **No class Monday, 11/12 (Veterans Day)** • AVL trees	Lab Assignment #9
Week 13 (11/19)	**Chapter 19 (cont.)** • AVL trees (cont.) • 2-3 and 2-4 (2-3-4) trees	Lab Assignment #10 Chapter 19 Quiz
Week 14 (11/26)	**Chapter 20** • Introduction to graphs • Minimum spanning trees	Lab Assignment #11
Week 15 (12/3)	**Chapter 20** • Dijkstra's algorithm • Applications of graphs • Exam review	Lab Assignment #12
Week 16 (12/10)	**Exam week** • (Monday) Final exam • (Wednesday) Big Data / application trends	**FINAL EXAM** **Monday 12/10** Chapters 16, 19, 20