

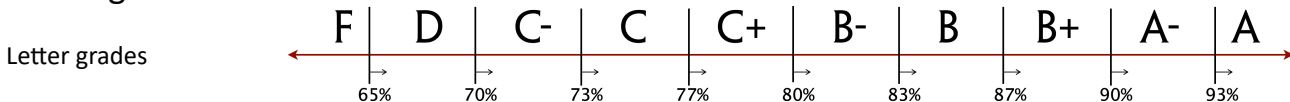
# Algorithms

CMPT 435 • Fall 2023

## Background

When and where	Wednesdays 8AM—9:15AM and Fridays 11AM—12:15PM in Hancock 1021	
Suggested Text	<i>Introduction to Algorithms</i> , 3 <sup>rd</sup> or 4 <sup>th</sup> edition by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Published by MIT Press. ISBN: 9780262533058 or 9780262046305	
Web	<a href="https://www.labouseur.com/courses/algorithms">https://www.labouseur.com/courses/algorithms</a>	
Instructor	Alan G. Labouseur Hancock 3007 (Office hours are posted by the door.)	Alan.Labouseur@Marist.edu 845-575-3832 Marist phone 845-440-1102 home office phone

## Grading



You can earn 1000 points over the course of the semester, broken down as follows:	Assignment 0	5.0%	50 points	[1, 2]
	Assignments 1, 2, 3, 4	40.0%	400 points (4 at 100 points each)	[1, 2]
	Mid-term Exam	25.0%	250 points	[1, 2]
	Final Exam	25.0%	250 points	[1, 2]
	Attendance and Participation	2.5%	25 points for quality and quantity	[1]
	Laziness and Whining	2.5%	25 points for not (lazy or whining)	[1]

## Objectives and Assessment

Assessment methods include assignments, quizzes, exams, discussions, presentations, peer review, and projects.	In this course, I hope that you will learn to <b>think like a computer scientist</b> , and...
[References] refer to Department of Computing Technology Goals available at <a href="https://www.labouseur.com/courses/goals.pdf">https://www.labouseur.com/courses/goals.pdf</a>	<ul style="list-style-type: none"><li>• gain and demonstrate an understanding of many fundamental concepts in the study of algorithms (including but not limited to sorting, searching, traversing trees and graphs, recursion, and dynamic programming) and their accompanying data structures [1, 2, 5];</li><li>• gain and demonstrate an understanding of asymptotics and their utility [2];</li><li>• gain and demonstrate an understanding of the techniques developing, analyzing, and proving correct different kinds of algorithms [1, 2];</li><li>• learn that developing the algorithms (and the software that is their implementation) is only half the battle, debugging and testing are critical skills for a talented professional, and skills that will be valuable. [1, 2]</li><li>• gain and demonstrate an understanding that the chasm between programs that work once and programs that work every time is ridiculously huge, and that their asymptotic runtime can be similarly (and also ridiculously) huge. [1, 2];</li><li>• enhance your continuing education skills. Capable problem solvers never stop learning. You will get practice in finding answers for yourself.</li></ul>
	Finally, many internship and job interview questions are based on this material. I want you to be so awesome that the company hires you on the spot and sends you home with a Brinks truck full of cash and unreleased video games, including Portal 3.

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– Schedule

#	Week		Due Friday	CLRS	Topics and Activities	
	Wed	Fri				
0	30-Aug	1-Sep	—	1, 2	Studying, characterizing, and analyzing algorithms and data structures	
1	6-Sep	8-Sep	0: LaTeX Limericks	10	Elementary data structures: Linked lists, Stacks, Queues, and (rooted) Trees	Asymptotic Analysis
2	13-Sep	15-Sep	—	3	Growth of functions and asymptotic notation Analyzing elementary data structures with asymptotic notation	
3	20-Sep	22-Sep	—	2.3	Sorting Lists - {permutation/monkey, selection, insertion} Detailed running time for Selection Sort	
4	27-Sep	29-Sep	—	2.3, 7	The <i>divide and conquer</i> philosophy, Merge sort, and Quick sort Recursion trees, Running time for Merge Sort and Quicksort	
5	4-Oct	6-Oct	1: Data Structures and Sorting	10.2, 11 p.799	Linear and Binary search Hashing with chaining (but probably not probing)	
6	11-Oct	13-Oct	—	—	<b>Mid-term Exam</b> — part 1 in Hancock 2023; part 2 in our usual room 1021 One-page study sheet permitted. Some restrictions apply.	
7	<del>18-Oct</del>	<del>20-Oct</del>	—	—	<i>No class meetings: Mid-semester break</i>	
8	25-Oct	27-Oct	2: Searching and Hashing	12, 13 18	Binary Search trees, Balanced trees B-trees	Asymptotic Analysis
9	1-Nov	3-Nov	—	22	Graphs in Theory and practice	
A	8-Nov	10-Nov	—	22	Graphs in Theory and practice	
B	15-Nov	17-Nov	3: Graphs and Trees	22 16	Breadth-first and depth-first traversals Greedy Algorithms - Fractional Knapsack	
C	<del>22-Nov</del>	<del>24-Nov</del>	—	—	<i>No class meetings: Thanksgiving Break</i>	
D	29-Nov	1-Dec	—	15, 24.1	Dynamic Programming with Bellman-Ford SSSP	
E	6-Dec	8-Dec	4: Dynamic and Greedy	4.3 - 4.6	The master method and its proof. Semester review	
F	13-Dec @ 8am		—	—	<b>Final Exam</b> — in Hancock 2023 from 8AM to 10AM One-page study sheet permitted. Some restrictions apply.	