COS226 Data Structures and Algorithms – Syllabus

In-Person

Version: 04

The Basics

Semester: Spring 2025

Instructor: Zachary Hutchinson

Room: Neville 116

Day/Time: MWF 2:00 PM to 2:50 PM

Email: zachary.s.hutchinson@maine.edu

Office: Boardman 131

Office Hours:

- Zac: MWF: 11-1, Th: 1-3

Texts:

- *Introduction to Algorithms* 4th Edition, Cormen, Leiserson, Rivest, Stein.

Updates: I will update the syllabus throughout the semester. You should refer back to it at least once a week. I will update the date at the top when new information is present. New information will be in blue.

Schedule

The following three sections comprise the course schedule and due dates. This syllabus is a living document; it is the course schedule. I will update it often.

Readings

Readings will be posted in this section. I advise you to read the material before the class in which it will be discussed. Come with questions. Note: we will jump around in the book somewhat dramatically.

- Week 1
  - Chapter 1 and start on Chapter 10
- Week 2
  - Chapter 12
- Week 3
  - We are covering basic self-balancing trees: Splay and AVL. I will post readings to Brightspace. These are not described in detail in the book.
- Week 4
  - Under Content->Readings there is a pdf on AVL trees. And you should also begin Chapter 13 on Red-Black Trees.

Homeworks

Homeworks will range from small written work to larger programming assignments. They and their due dates will be posted below.

- Homework 1 - Due Feb 5th Midnight
- Homework 2 - Due Feb 19th Midnight

Quizzes

Quiz times will be published here and announced in class. I also try to include the topics quizzes will cover.

- Quiz 1: Feb 3 - Arrays, Linked Lists, Stacks and Queues
- Quiz 2: Feb 12 - BST and Splay Trees

Topics

The following topics give a general outline of semester content. However, the Readings section above should be your week-to-week goto for where we are with respect to specific topics.

1. Week 01
   - Introduction
   - Abstract Data Types vs Implementation
   - The Basics (Arrays, Lists, Stacks, Queues, Sets, Maps)
2. Week 02
   - The Basics, con't.
   - The Fundamentals of Trees
   - N-ary Trees (BST, Trie)
3. Week 03
   - Self-balancing Trees (AVL, Red-Black, Splay, B-Trees)
4. Week 04
   - Self-balancing Trees, con't.
5. Week 05
   - Probabilistic Data Structures
6. Week 06
   - Heaps
7. Week 07
   - Sorting
8. Week 08
   - Sorting, con't
9. Week 09
   - Hashing and Hash Tables
10. Week 10
    - Graphs and Graph Algorithms
11. Week 11
    - Graphs, con't
12. Week 12
    - Dynamic Programming
13. Week 13
    - Complexity
14. Week 14
    - String Matching
15. Week 15
    - Final Conversations

Grades

Your final grade is the weighted sum:

- 40% Homework
- 40% Quizzes
- 20% Participation

The scale used in this course is:

- A: 100 - 90

- B: 89 - 80
- C: 79 - 70
- D: 69 - 60
- F: 59 - 0

Late Policy

Late **homework** will require permission. Late homeworks without permission will not be graded. Permission means that you email me in advance of the due date. Please don't ask to turn in late material after the due date has passed.

Late **quizzes** cannot be made up. If you miss a quiz, you will need to take the final. The final can replace up to 2 lower quiz grades.

Obviously, participation cannot be made up.

However, if some serious life event takes you out of commission for a while, contact me immediately. For really big events, rules can be broken. Don't drop the class or give up completely if life really gets in the way. Get in contact **right away**.

Coursework Overview

Quizzes: Quizzes will cover fundamental concepts from the class lectures and book.

Homework: All homeworks will be programming assignments.

Participation: Every week we will have either an inclass exercise or take attendance. For the exercises, you will be graded on work, not correctness.

Course Topic Background

Data Structures and Algorithms: the proverbial meat and potatoes of programming. This might be the most important course of CS fundamentals you take for a major or minor. A proper understanding of data structures and associated algorithms unlocks an ability to develop larger and more efficient programs. Internalizing the contents of this course will alter the way your approach every programming task.

This course will take a *hands-on* approach to learning data structures. *You don't know it until you build it.* This means you will be required to program, from scratch, several complete data structures and algorithms. Theoretical and mathematical analysis will follow the hands-on experience.

We will cover several basic data structures, such as lists, trees, hashtables, and a variety of algorithms, such as greedy, graph, searching, sorting.

Use of LLMs

Don't. You are enrolled in the class, not an LLM. I am *very* interested in what you have to say, no matter how well or poorly you formulate your thoughts. I am not interested in anything an LLM has to say with respect to this course or its assignments. I am interested in the process by which you produce work. I am interested in how you start, refine and polish your ideas. If you turn over any aspect of this process and skill set to an LLM, you are depriving yourself of the opportunity to practice your craft.

IMPORTANT INFO

Academic Honesty

Academic Honesty Statement: Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, or generated by software or systems without the explicit approval of the instructor, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University. Please see the University of Maine System's Academic Integrity Policy listed in the Board Policy Manual as Policy 314

Student Accessibility

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, um.sas@maine.edu, 581.2319, as early as possible in the term. Students may begin the accommodation process by submitting an accommodation request form online and uploading documentation at https://umaine-accommodate.symplicity.com/public_accommodation/. Once students meet with SAS and eligibility has been determined, students submit an online request with SAS each semester to activate their approved accommodations. SAS creates an accessibility letter each semester which informs faculty of potential course access and approved reasonable accommodations; the letter is sent directly to the course instructor. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (Zachary Hutchinson) privately as soon as possible.

Course Schedule Disclaimer

In the event of an extended disruption of normal classroom activities (due to COVID-19 or other long-term disruptions), the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Observance of Religious Holidays/Events:

The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

Sexual Discrimination Reporting

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination involving members of the campus, your teacher is required to report this information to Title IX Student Services or the Office of Equal Opportunity.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For confidential resources on campus: Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.

For confidential resources off campus: Rape Response Services: 1-800-871-7741 or Partners for Peace: 1-800-863-9909.

Other resources: The resources listed below can offer support but may have to report the incident to others who can help:

For support services on campus: Title IX Student Services: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911. Or see the Title IX Student Services website for a complete list of services. Also, Student Wellness Resource Center.

Information on Research Conducted in this Course:

This course is one of several courses on campus participating in an innovative program that uses research to modify instruction. Student data are gathered and analyzed as part of this program. For more information on your possible participation in this research, please refer to the Informed Consent Document that will be posted to your course website by the second week of the course. You will hear more about this research in class. If you have any questions about the research please ask your instructor or email research coordinator Chrissy Siddons (christina.siddons@maine.edu).