Syllabus - COMP 340 - Analysis of Algorithms

Fall 2025

1 Logistics

- **Where:** Center for Science and Business, Room 303
- **When:** TTh, 11:00am-12:15pm
- **Instructor :** Logan Mayfield
  - *Office:* Center for Science and Business, Room 344
  - *Phone:* 309-457-2200
  - *Website:* `http://jlmayfield.github.io/`
  - *Email:* lmayfield *at* monmouthcollege *dot* edu
  - *Office Hours:* When the door is open. By appointment. MWF 10-11am. MF 2-3pm.
- **Website:** `http://jlmayfield.github.io/teaching/COMP340/`
- **Credits:** 1 course credit

Note: This Syllabus is subject to change based on specific class needs. Deviations from the syllabus will be discussed in class.

2 Description & Content

Algorithms are one of the most crucial areas of study in Computer Science. In this course, students will learn the basic tools of algorithm design and analysis through the study of some of the most well known and important algorithms. By the end of the semester, students will have developed not only a firm grounding in the analysis and design of algorithms, but working knowledge of the algorithms that have made computing what it is today.

While it certainly is possible to study algorithms in the absence of programming, concrete implementations provide a tangible means of playing with the course material. As a part of the class, students will design, implement, and present algorithmic challenges from the text. Regular presentations of code will provide a backdrop for discussions of the relationships between programming, algorithms and the science of computing.

3 Texts

Skiena, Steven S. *The Algorithm Design Manual*. Third Edition. Springer. London. 2020.
ISBN: 978-3-030-54256-6.

Skiena, Steven S. "The Algorithm Design Manual, 3rd Edition". *Steven Skiena*. 4 Jan, 2022. *algorist.com*.

3.1 Topics

This course will cover the bulk of chapters 1–5, 7–10, and 13. The overall flow of the course is as follows

- Why? [Chapter 13]
- Basic Design and Analysis [Chapters 1-2]
- Building Blocks: Data Structures & Sorting [Chapters 3–4]
- Divide and Conquer [Chapter 5]
- Graphs [Chapters 7–8]
- Dynamic Programming [Chapter 10]

Time and interest permitting, we'll explore the remaining topics from the text:

- Combinatorial Search [Chapter 9]
- La Dura Dura [Chapters 11–12]
- That's So Random [Chapter 6]

4 Workload

The weekly workload for this course will vary by student but on average should be about 13 hours per week. The follow tables provides a rough estimate of the distribution of this time over different course components. Study time and Project time is amortized for the whole semester, but the work will, as usual, come in spurts.

Assignment Type	Time/week
Lectures	2.5 hours/week
Homework & Programs	3 hours/week
Exam Study Time	1 hours/week
Project	1 hours/week
Reading	2.5 hours/week
	10 hours/week

The by assignment break down is as follows:

Category	Number of Assignments
Homework: Chapter Exercises	7–9
Problems: Leetcode & Interview Problems	5
Exams	5
Project	1

Exams

There is no midterm or final exam in the sense that the exams are worth more than other exams or that they will necessarily take longer than other exams. Exams will cover material covered since the previous exam. Unless stated otherwise, assume that exams will be pencil and paper and that computers will not be available during the exam period.

Homework

Homework will consist of exercises from the end of the chapters. Expect them to be assigned in bulk, before the material is covered and due right as we conclude the relevant material. The intent is for you to work ahead and work as we go rather than wait until we're done to start. Working in groups is encouraged but work should still be done honestly.

Program

Program assignments consist of either Leet Code or Interview problems from the end of the chapters. Students can expect to choose one or two options. Some, but not all, problems will be presented to the class as part of the assignment.

Project

At the end of the semester students will complete one of the chapter implementation or design challenges. They will then present their solution along with relevant algorithmic problems from section II of the text. The overall emphasis of this project is connecting concrete algorithmic work to general algorithmic problems and not simply to complete the challenge.

Portfolio Review & Self-Evaluation

Self-reflection and self-evaluation is a critical component of learning and vital to a growth mindset. We will keep a portfolio of the work you do throughout the semester. Much of this will be done automatically by our assignment management and version control software. At regular intervals throughout the semester you will meet, one-on-one, with me to *present your porfolio*, review items from your portfolio that best gauge how well you're doing at meeting the course goals and expectations, and discuss how that success maps to a letter grade. For more details about the process visit `https://jlmayfield.github.io/teaching/ungrading/howto-portfolio`.

5 Ungrading & Final Grades

This class is largely ungraded. That means your assignments will not be graded for points and your final grade is not determined by a point-based, numerical grading system. You will get feedback on your work but you will see points on nothing. You don't earn points for doing work or getting something correct nor do you lose points for getting something wrong. We're here to learn. Doing the work is how we do that and getting things wrong some or most of the time is part of learning. For more details visit `https://jlmayfield.github.io/teaching/ungrading/howto-portfolio`.

5.1 Self-Evaluation & Final Course Grades

Throughout the semester you'll be asked to engage in regular self-evaluation. This process is described in detail in additional documentation. Part of the process includes you self-assigning a course grade based on your self-evaluation. Your self-evaluation and self-assigned grade are then discussed with me in a one-on-one meeting during which we'll agree upon your current grade. The key here is that *your self-evaluation and self-assigned grade begins the conversation, not my assigned points.*

Below are some general rules of thumb we'll try to stick to when talking about grades. They relate grades to course competency expectations and Monmouth College policy.

- **A** - Exceeding course expectations.
- **B** - Meeting and occasionally exceeding course expectations.
- **C** - Meeting course expectations. *This is the minimum grade required to continue on to COMP152. So, a C means you can be successful in a class that builds upon the things learned in this class.*
- **C-** - Mostly meeting course expectations. *This is the minium grade that counts towards a major.*
- **D** - Occasionally meeting course expectations, but mostly not. *Grades in the D range earn credit towards graduation but fall below GPA requirements.*
- **F** - Did not meet course expectations.

My hope is that the self-evaluation and self-directed grading process provides a lot of flexibility in terms of how you can achieve success in this course and meet your grade goals. If you ever have questions or concerns about self-evaluations and grades, then I'm more more than willing to discuss them with you at any time.

5.1.1 Participation, Attendance, & Timely Work

I do not have strict attendance and deadline policies, per se, but I do have clear expectations. These expectations are baked into the dispositional attribute of the course competencies. This attribute includes things like being *professional, responsible, responsive, and self-directed.*

As far as I'm concerned, signing up for this class means you agree to coming to class and lab, being on time for class and lab, doing assigned work and submitting it on time, and generally participating in all the class has to offer. That being said, life happens and people have different priorities. You might need to miss class or extend a deadline. So long as you communicate with me about it, as a professional would with a co-worker, then we won't have a problem. If you simply skip class without warning, always show up late, or regularly fail to do assigned work in a timely manner, then I expect that those failures to meet dispositional expectations to be reflected in your self-evaluation.

There is one exception to my "no grade-based policy" on assignments and deadlines and that is the self-evaluations and reflections. The self-evaluation process is critical to this class and in no way optional. **If you fail attend the portfolio review meetings or always show up completely un-prepared then I reserve to give you a final grade of D or lower for the course.** You'll find I can be pretty relaxed about a lot of other assignments and deadlines, but I draw the line at the self-evaluation process.

Academic Honesty

You don't learn by trying to pass off someone's work as your own. In an ungraded class it makes even less sense to cheat and steal work from somewhere else. There are no points, you gain nothing from it and you certainly will learn nothing from it. In this ungraded class, academic dishonesty is still not tolerated.

From the Monmouth College Academic Honesty Policy:

> "We view academic dishonesty as a threat to the integrity and intellectual mission of our institution. Any breach of the academic honesty policy - either intentionally or unintentionally - will be taken seriously and may result not only in failure in the course, but in suspension or expulsion from the college. It is each student's responsibility to read, understand and comply with the general academic honesty policy at Monmouth College, as defined here in the Scots Guide, and to the specific guidelines for each course, as elaborated on the professor's syllabus."
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> "The following areas are examples of violations of the academic honesty policy:
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> 1. Cheating on tests, labs, etc;
> 2. Plagiarism, i.e., using the words, ideas, writing, or work of another without giving appropriate credit;
> 3. Improper collaboration between students, i.e., not doing one's own work on outside assignments specified as group projects by the instructor;
> 4. Submitting work previously submitted in another course, without previous authorization by the instructor."
>
> "Please note that this list is not intended to be exhaustive."

In this course, any violation of the academic honesty policy will have varying consequences depending on the severity of the infraction as judged by the instructor. Expect violations to be reported to the appropriate Dean and to weaken your case for higher grades at the end of the course. Severe violations can result in an F for the course and expulsion from the course. Do your own work. If you even think something you're doing could be construed as academically dishonest, then ask for guidance and clarification first.

Generative AI Policy

In general, you are not allowed to use generative AI to generate any portion of your work. No ChatGPT, no Github CoPilot, none of that. If you're turning the work into me with your name on it, then it should be your work. Writing or tweaking a prompt to generate a solution is not the same as actually generating the solution on your own. We may explore the use of these tools in developing software systems and writing code, but in such cases you will be explicitly told that you can use AI. If you use AI to generate work without the express permission of the instructor, then you will have committed an act of academic dishonesty and will face appropriate consequences (see above).

While you cannot use AI to generate work, you can use AI as a study guide and a tool to assist in learning. This includes getting new study problems from an AI, having AI summarize or paraphrase portions of a reading when studying (not as part of an assignment!), and otherwise finding creative uses for AI. If, at any point, you are in doubt about whether or not your use of AI is appropriate for the course, ask. In fact, I'd love to hear about creative ways you're using AI.

6 Academic Support & Accessibility

Support Services

The Academic Support and Accessibility Services Office offers free resources to assist Monmouth College students with their academic success. Programs include Supplemental Instruction for difficult classes, Drop-In and appointment tutoring, and individual Academic Coaching. Our office is here to help all students excel academically, since every student can work toward better grades, practice stronger study skills, and manage their time better. Please email academicsupport@monmouthcollege.edu for assistance.

Accessibility Services

If you have a disability and/or medical/mental health condition or had academic accommodations in high school or another college, you may be eligible for academic accommodations at Monmouth College under the Americans with Disabilities Act (ADA). Monmouth College is committed to equal educational access. To discuss any of the services offered, please call or meet with Jennifer Sanberg, Associate Director of Academic Support and Accessibility Services. The ASAS office is located on the first floor of the Hewes Library, opposite Einstein's Bros Bagel. They can be reached at 309-457-2257 or via email at: academicsupport@monmouthcollege.edu

7 Calendar

The overall flow of the course and the work you'll be doing is as follows:

Section	Chapters	Assignments
Why?	13	
Reasoning	1–2	Homework 1–2. Program 1. Exam 1.
Building Blocks	3–4	Homework 3–4. Program 2. Exam 2.
Divide & Conquer	5	Homework 5. Program 3. Exam 3.
Graphs	7–8	Homework 6–7. Program 4. Exam 4.
Dynamic Programming	10	Homework 8. Program 5. Exam 5.
Project Time!	1–13	Project 1.
Time Permitting		
All the Things . . . ish	9	
La Dura Dura	11–12	
Rando	6	

This workflow will roughly map to this calendar. *This calendar is subject to change based on the circumstances of the course.* Precise dates and other day-to-day details can be found on the course website.

Week	Dates	Notes	Assignments Due	Chapter(s)
1	8/20–8/22			13,1
2	8/25–8/29			1
3	9/1–9/5		Homework 1.	2
4	9/8–9/12		Homework 2. Program 1.	2
5	9/15–9/19		Exam 1.	3
6	9/22–9/26		Homework 3.	3,4
7	9/29–10/3		Homework 4. Program 2.	4
8	10/6–10/10	FALL BREAK (Th-F)	Exam 2.	
9	10/13–10/17		Homework 5.	5
10	10/20–10/24		Program 3. Exam 3.	5
11	10/27–10/31			7
12	11/3–11/7		Homework 6.	7,8
13	11/10–11/14		Homework 7.	8
14	11/17–11/21		Program 4. Exam 4.	8,9
15	11/24–11/28	THANKSGIVING (W-F).		9
16	12/1–12/5		Homework 8. Program 5.	9
17	12/11	W. 8–11	Exam 5. Project.	