CS-230 Algorithms and Data Structures | Fall 2025 | Course Syllabus

Professor Mason Brown

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- **Office:** SCCT 3005
- **Office Hours:** Tue / Thu 10 – 12; Wed 4 – 5

Course Logistics

- **Lectures:** Mon, Wed and Fri 01:00 - 01:50pm Taylor Science Center 3040
- **EdStem:** https://edstem.org/us/join/pyWgSh
- **Gradescope:** https://www.gradescope.com/courses/1082371 **Code:** R5BJRY
- **Exit questions:** https://forms.gle/DT4X57HixA5qQPLp8

Course Description

This course explores fundamental algorithms and data structures, focusing on their correctness and the trade-offs between different techniques, while incorporating key topics from discrete mathematics and software engineering. We cover running time and space analysis, using invariants to prove correctness, and three major algorithm design approaches: divide-and-conquer, greedy, and dynamic programming. You will write unit and automated test pipelines. The course examines applications including graph traversals, optimal sorting and searching methods, minimum spanning trees, shortest paths, longest common subsequences, balanced search trees, heaps, and hashing.

Prerequisites

- CPSCI-101
- CPSCI-102

QSR center

The QSR center runs a facilitated study group. Sessions are available to help you to form working study groups and encourage peer-to-peer collaboration with tutor support. Drop-in tutoring is available. Reach out to the QSR center at https://www.hamilton.edu/ academics/centers/qsr.

Course Materials

Textbooks

- **Required:** *Algorithms Illuminated 1st edition* **available: https://www.algorithmsilluminated.org.**
- Recommended: Algorithms *1st edition* available: https://jeffe.cs.illinois.edu/teaching/algorithms/
- Optional: *Introduction to Algorithms 3rd edition (CLRS)* available: https://www.amazon.com.au/Introduction-Algorithms-Thomas-Dartmouth-College/dp/0262033844.

Laptops and Electronics

You will not use a laptop during our Monday and Wednesday lecture. I would encourage bringing a laptop in case of technical difficulties with projectors. You should bring a laptop to our Friday lecture that I will run as a lab. If you are unable to do this, let me know via email. You should not use a phone or any similar device during lectures. If you take notes on a tablet, then you should not be typing on it during class but only writing (E.g. with a stylus) unless you require accommodations. If you would like to discuss this restriction, you are always welcome to come talk to me about it.

Software

You'll *need access to a computing environment that supports programming in Python and C++ using any IDE. I recommend [VS Code](https://code.visualstudio.com) which can be installed from*: https://code.visualstudio.com.

Grading

- **Problem sets (40%):** Problem sets consist of weekly written/math and coding questions. We will use Friday as a lab to work through similar problems to the weekly problem sets and exam questions. On Gradescope you will see two submission points for most problem sets. Written submission will be used for written answers to math-based questions. Code submission should be used for code and answers to problems that request code. These answers should be at the end of your code as a comment. Problem sets are due Sunday midnight.
- **Exams (50%):** Two midterm exams (15% each) and one final exam (20%) will be held.
- **Participation and attendance (10%):** Participation (5%) is important to show me you are actively engaging with the course material before, during, and after class. I count reviewing slide decks, completing readings from one of the two textbooks, running provided python and C++ files, completing the pre-lecture activities, answering exit questions, and posting on EdStem as participation. Attendance (5%) is required for the course.

All final course grades will be rounded to the nearest whole number. There will be no grade bumping. Your grade in this class is the reflection of mastery of course content, and consistent demonstration of your ability to meet or exceed the criteria of individual problem sets and the exam. Effort will not be factored into your grade. This course will use the Gradescope for all assignment submissions. Grades will be posted throughout the course on blackboard.

Grade Cutoff	Letter Assignment
93%	A
90%	A-
87%	B+
83%	B
80%	B-
77%	C+
73%	C
70%	C-
67%	D+
63%	D
0%	F

Course Policies

EdStem

All communication for this course happens through the course EdStem server. It is your responsibility to check EdStem for updates and communication from me. You are encouraged to ask and answer each other's questions, following the guidelines under Academic Integrity & Collaboration. Any personal communication, or communication for which privacy is desired, should be done via email or in one-on-one meetings with me. EdStem has resources on it now.

Attendance

You are expected to attend every class. You may be excused only for college-sanctioned activities, but you must let me know about such absences as soon as you are notified. Class is your priority, and it is your responsibility to move external activities (E.g., work / hobbies). This includes religious, athletic, or academic conflicts. If you are sick or have an appointment at the health or counseling center, please email me before the class. Take care of yourself physically and emotionally. If you will be absent for a period, please contact me to work out a way to catch up.

If you must miss a lecture for a college-sanctioned activity, you must notify me prior to the class in question via email. In this event, you will do the lab on your own time. Aim to be at the lecture and labs five minutes before they start. Lectures and labs will start on time. Notify me via email if you cannot arrive on time due to a prior class location. If it is past five minutes after the start time, please wait at the door to not distract students in class. If there is a reason you cannot make it to the class before five minutes past the scheduled times, email me.

Late Assignments and Makeups

Given all materials are provided the first week, no late work will be accepted without prior permission. Poor planning is not a valid reason for late submission. If you contact me at least three days before a due date with an appropriate request for extension (E.g., Surgery), you will be given an additional amount of time to make up late problem sets equal to the time lost due to the unforeseen circumstance. Unless of emergency, no extensions the day before or on a due date will be given.

Incompletes

Incompletes will be granted for only the most extreme circumstances. To be considered for an incomplete you must 1) let me know at in advance that you are seeking an incomplete, and 2) provide documentation to support the request. This decision is also made in consultation with the Dean of Students.

Re-Grade Requests

If you believe I have made a genuine error when grading your assignment, please submit a grade review request through Gradescope with an explanation describing why the grade received is incorrect, with references to the posted rubric. Please email me in addition, so I can address the concern ASAP. Grade reviews must be requested within one week of a grade being posted. After this time, no grade will be revisited. In the event of a grade review, the entire assignment will be reviewed. Similarly, inquiries about missing grades must be made within one week of grades being posted.

Academic Integrity & Collaboration

For each problem set, you should write the solution yourself. You may discuss ideas with other students in the class, including helping other students with their code. If another student provides an idea during discussions or a study group to aid you in a solving a problem but you do not fully understand that idea, you should not implement it until you do. You may be asked at any point to explain your code or solution. You are never allowed to copy any amount of code from another student or from other sources, including the internet. Sharing or receiving code, typing code into others' editors, allowing someone to type into yours, and copying code from online resources (E.g., GitHub, YouTube, Course Hero etc.) is not allowed. Your code will have your own style; you will make mistakes; it's very easy to detect cheating.

If you need help come to office hours and consult with me. If you accidently see a very similar solution online to a given problem, you should immediately tell me, and I will give you another problem to work on. If you complete the reading, pre-lecture sheet, review the slides, review code and attend lectures, you will be well prepared for the problem sets. If you are unsure about collaboration rules, ask me. Searching for exact solutions online or using large language models such as ChatGPT, Copilot, or any other generative tools to complete problem sets is cheating your time, money, and self. It will be identified either now or in the future. Use of any LLM in this course is prohibited.

Code Policy

You may not post code provided to you or that you write in this class publicly (E.g. GitHub, your blog, etc.), even after the semester ends. This is to ensure that current and future students can't find answers. You may provide your code privately to potential employers.

- Never have anyone else type into your text editor
- Never copy code from another student, the internet, or an LLM (E.g., ChatGPT)
- Cite any collaboration or outside reference you use
- Discussing problems and high-level ideas with a study group is encouraged
- Ask if you are unsure

Consequences for Academic Dishonesty

Academic integrity is important, and I will not tolerate violations. Egregious violation of these rules (i.e., cheating on an exam, plagiarism that is beyond overlooking a citation for a line or two of code, etc.) will result in a final grade of 'F' for the class and additional actions.

Seeking Help

Accommodations

If you believe you may need accommodation for a disability, contact me privately within the first two weeks of the semester to discuss your specific needs. If you have not already done so, please contact Allen Harrison, Assistant Dean of Students for International Students and Accessibility at 315-859-4021, or via email at aharriso@hamilton.edu. He is responsible for determining reasonable and appropriate accommodations for students with disabilities on a case-by-case basis.

Mental Health and Wellness

If you are feeling isolated, depressed, sad, anxious, angry, or overwhelmed, you aren't alone: we all (including professors) struggle sometimes. Don't stay silent! Talk to a trusted confidant: a friend, a family member, a TA, a professor you trust. The counseling center offers completely confidential and highly professional services and can be contacted at 315-859-4340. If this seems like a difficult step, contact me. We can chat. If you'd like we can talk and call or walk to the counseling center together as well.

Communication Policy

The best way to reach me is via email. Please include your full name, course (CS230), and a short description of your question. I typically respond within 24 hours. Please note if it is outside work hours, I will likely not respond till hours resume. You are always welcome at my office without an appointment during office hours. During the listed office hours (see the top of this document or Compass), I keep an open-door policy, you do not need to send an email in advance to attend.

Before you come to office hours, I ask that you first spend time reviewing the documentation and trying the problem. While I cannot provide direct solutions to graded problem set questions, I can help you in several ways by clarify the wording of the problem or restate what it's asking, ask guiding questions to help you think through your approach, reiterate information shared in class, review the high-level concepts from lecture that connect to the problem, suggest strategies, staff (QSR), or additional problems to try. If you are looking for more step-by-step, tutor-style help with math or coding, again the QSR Center is an excellent resource, and I encourage you to take advantage of it.

Course Outline

Week	Date	Pre-class sheet	Weekly Topics and Required Reading	Code	Problem Set
00	Aug 29th	No	**Introduction (AI P1 1.1 - 1.3, 3.1)** Lecture 0: Introduction to the course and review	No	Problem Set 0 – Review Sheet
01	Sep 1st Sep 3rd	No	**Divide & Conquer (AI P1 1.4-1.6, 2; CLRS 2.3, 3)** Lecture 1 part 1: Recursion Lecture 1 part 2: Asymptotic Analysis	Yes	Problem Set 1 – Testing & Asymptotic Analysis
02	Sep 8th Sep 10th	Yes	**Recurrence & Selection (AI P1 4, 6; CLRS 4.3-4.5, 9)** Lecture 2 part 1: Solving Recurrences Lecture 2 part 2: Median and Selection	Yes	Problem Set 2 – Search & multiplication
03	Sep 15th Sep 17th	Yes	**Randomization & Sorting (AI P1 5, 5.6; CLRS 5.1-5.3, 7, 8.1, 8.2)** Lecture 3 part 1: Randomized Algorithms Lecture 3 part 2: BucketSort and Lower Bounds	Yes	Problem Set 3 – Recurrences & Fibonacci
04	Sep 22nd Sep 24th	No	**Algorithms in the Real World** Lecture 4: Value Judgments Midterm Exam 1	No	Problem Set 4 – Exponentiation & Majority
05	Sep 29th Oct 1st	Yes	**Trees & Hashing (AI P2 11, 12; CLRS 11, 12.1-12.3, 13)** Lecture 5 part 1: Binary Search & Bed-Black Trees Lecture 5 part 2: Hashing	Yes	Problem Set 5 – Medians & Randomization
06	Oct 6th Oct 8th	Yes	**Graphs (AI P2 7, 8.1-8.6; CLRS 22.1-22.5)** Lecture 6 part 1: DFS & BFS Lecture 6 part 2: Strongly Connected Components	Yes	Problem Set 6 – Matching & Partitioning
07	Oct 13th Oct 15th	No	**Ethical Algorithm Design + Midterm Exam 2** Lecture 7: Calculating Ethical Constraints Midterm Exam 2	No	Problem Set 7 – Red-Black & Radix
08	Oct 20th Oct 22nd	Yes	**Weighted Graphs (AI P2 9, P3 18.1, 18.2; CLRS 24.3)** Lecture 8 part 1: Algorithms Lecture 8 part 2: Moving towards DP	Yes	Problem Set 8 – Data Structures & TST
09	Oct 27th Oct 29th	Yes	**Dynamic Programming (AI P3 16, 18; CLRS 15.1, 15.4, 25.2)** Lecture 9 part 1: Bellman-Ford & Floyd-Warshall Lecture 9 part 2: LCS, Knapsack, Independent Set	Yes	Problem Set 9 – Hashing
10	Nov 3rd Nov 5th	Yes	**Greedy Algorithms (AI P3 13, 14; CLRS 16.1-16.3)** Lecture 10 part 1: Scheduling Lecture 10 part 2: Structure & Properties	Yes	Problem Set 10 – Graphs
11	Nov 10th Nov 12th	Yes	**Minimum & Maximum (AI P3 15; CLRS 23, 26.1-26.3)** Lecture 11 part 1: Min Spanning Trees Lecture 11 part 2: Max Flow & Ford-Fulkerson	Yes	Problem Set 11 – Floyd-Warshall
12	Nov 17th Nov 19th	No	**Stability** Lecture 12 part 1: Stable Matchings Lecture 12 part 2: Gale-Shapley Algorithm	No	Problem Set 12 – DP
13	Dec 1st Dec 3rd	No	**Review** Lecture 13 part 1: Review Lecture 13 part 2: Additional Algorithms	No	Problem Set 13 – Review
14	**Dec 17th**	**Final Exam 2-5pm**			

September 4th Last day to add a course

October 3rd Last day to exercise credit/no credit and last day to drop a course