

DS 320 Algorithms for Data Science

Fall 2026 Syllabus

Official Course Description

This course covers the fundamental principles underlying the design and analysis of algorithms. We will walk through classical design methods, such as greedy algorithms, design and conquer, and dynamic programming, focusing on applications in data science. We will also study algorithmic methods more specific to data science and machine learning. The course places a particular emphasis on algorithmic efficiency, crucial with large and/or streaming data sets, for which multiple scans of data are infeasible, including the use of approximation and randomized algorithms.

Weekly Cadence

- Lectures:
 - A1: Tuesday/Thursday 2-3:15pm @ EPC 207
 - B1: Monday/Wednesday 2:30-3:45pm @ EPC 207
- Homework:
 - Released Thursdays via Piazza
 - Due Wednesdays 11:59pm in Gradescope
- Discussions
 - Monday/Wednesday 10:10-11, 11:15-12:05, 12:20-1:10

Course Staff

- Instructor: Jeffrey Considine
 - Office: CDS 1645
 - Office hours: Monday 10-12, Tuesday 9:30-10:30, Wednesday 1-2
 - Email: jconsidi@bu.edu
- Teaching Fellow: Yuqi Tu
 - Office: Will be posted in Piazza
 - Office hours: Tuesday 3-6pm
 - Email: yuqitu@bu.edu
- Teaching Fellow: Anush Kini
 - Office: Will be posted in Piazza
 - Office hours: Monday 1:20-2:20, Monday 4:30-5:30, Tuesday 12:30-1:30
 - Email: akini@bu.edu

Schedule

This schedule is subject to change, particularly towards the end of the course.

Lectures

#	A1 Date	B1 Date	Lecture Topic
1	Thu 9/3	Wed 9/2	Introduction
2	Tue 9/8	Wed 9/9	Insertion Sort and Induction
3	Thu 9/10	Mon 9/14	Loop Invariants and Induction
4	Tue 9/15	Wed 9/16	Depth-First Search
5	Thu 9/17	Mon 9/21	Topological Sort and Breadth-First Search
6	Tue 9/22	Wed 9/23	Greedy I: Dijkstra's Algorithm and Shortest Paths
7	Thu 9/24	Wed 9/30	Greedy II: Interval Scheduling
8	Thu 10/1	Mon 10/5	Greedy III: Optimal Caching and Greedy Exchange
9	Tue 10/6	Wed 10/7	Greedy IV: Scheduling to Minimize Lateness
10	Thu 10/8	Tue 10/13	Divide & Conquer I: Merge sort, Solving Recurrences
11	Thu 10/15	Wed 10/14	Divide & Conquer II: Closest Pair of Points
12	Thu 10/22	Wed 10/21	Divide & Conquer III: Integer and Matrix Multiplication
13	Tue 10/27	Mon 10/26	Dynamic Programming I: Weighted Interval Scheduling
14	Thu 10/29	Wed 10/28	Dynamic Programming II: Knapsack
15	Tue 11/3	Mon 11/2	Dynamic Programming III: Segmented Least Squares
16	Thu 11/5	Wed 11/4	Dynamic Programming IV: Bellman-Ford
17	Thu 11/12	Wed 11/11	NP-Completeness I: Reductions
18	Tue 11/17	Mon 11/16	NP-Completeness II: Proving NP-Hardness
19	Thu 11/19	Wed 11/18	Linear Programming I: Introduction
20	Tue 11/24	Mon 11/23	Linear Programming II: Algorithms and Approximations
21	Tue 12/1	Mon 11/30	Linear Programming III: Duality Theory
22	Thu 12/3	Wed 12/2	Linear Programming IV: Zero-Sum Games and Minimax Thm
23	Tue 12/8	Mon 12/7	Online Learning and Multiplicative Weight Update
24	Thu 12/10	Wed 12/9	Stable Matching

Exams

	A1 Date	B1 Date	Exam Focus (not exclusive)
Exam 1	Tue 9/29	Mon 9/28	Induction, asymptotics, data structures, graph algorithms
Exam 2	Tue 10/20	Mon 10/19	Greedy algorithms, divide & conquer I-II
Exam 3	Tue 11/10	Mon 11/9	Divide & conquer III-IV, dynamic programming
Final	TBD	TBD	All course material

Course Infrastructure

- [Piazza](#) for course announcements and questions.
- [Gradescope](#) for assignments and exams (entry code 2DNE3G). All regrade requests must be submitted through Gradescope within a week of grades being posted.
- [Echo360](#) for lecture recordings. These will primarily be best effort iPad screen recordings, but backup recordings will be made automatically if the room is equipped.

Textbooks

There are no required textbooks for this class, but you may find these ones helpful.

- [Algorithm Design](#) by Kleinberg and Tardos. Closest match to this course.
- [Introduction to Algorithms](#) by Cormen, Leiserson, Rivest and Stein.
- [Algorithms](#) by Erickson. Link is to free PDF from the author.

Course Assessment

Grades will be based on the following assessments and weights.

- Participation: 5%
- Homework assignments: 15%
- 3 in-class exams: 60%
- Final exam: 20%

Late submissions will usually be allowed for up to four days but will be penalized 1% per hour based on last submission times recorded by Gradescope. This penalty will be applied separately from the raw scores that you see in Gradescope. See Gradescope for assignment-specific deadlines.

Participation will be tracked via participation cards submitted at the end of class. There will be five participation periods of three weeks each. Submitting once in each participation period is sufficient for full credit.

Assignment Extension and Makeup Exam Policies

Students are expected to track course deadlines and exam dates. Extensions and makeup exams are reserved for documented extraordinary circumstances, not for ordinary workload management, forgetting deadlines, or delayed reporting of past issues.

Requests

- Extension and makeup exam requests must be made as soon as the conflict is known. Except in emergencies, requests should be made before the relevant deadline or exam time.
- Illnesses and emergencies must be reported as soon as reasonably possible. Requests may be denied if the student did not contact the instructor at the time or as soon as they were able.
- Requests should identify the affected assignment or exam, explain the reason for the request, state when the issue began, and describe the specific arrangement being requested. Documentation may be required, especially for after-the-fact requests.

Reasons That Are Not Normally Grounds for Extensions or Makeup Exams

Forgetting a deadline, forgetting to submit, submitting the wrong assignment, misreading the syllabus, being busy with other courses, having multiple assignments due, work obligations, travel plans, technical problems, file upload errors, computer problems, waiting until the last minute to submit, or general end-of-semester workload are not normally grounds for an extension or makeup exam.

Previous extensions or makeup exams do not themselves justify additional extensions or later makeup exams. Students are expected to use any approved extension or makeup arrangement to get caught up.

Limits on Extensions and Makeup Exams

- Extensions and makeup exams will not be granted after solutions for that assignment are posted or after grades for that assessment are released.
- If you join the class after an assignment has been released, contact the instructor immediately to discuss arrangements. Events that occurred before you joined the class will not be considered reasons for extensions on assignments released after you joined the class.
- When makeup exams are allowed, they must normally be completed during the same week as the original exam. Scheduling is based on instructor availability and the student's scheduled classes. Students are expected to prioritize course obligations during normal university hours; non-course commitments may limit the available makeup options.
- If you do not respond promptly, usually within 24 hours, to scheduling messages about a makeup exam, you may lose the opportunity to take the makeup exam.

Exceptions and University Policies

All extensions and makeup exams are subject to instructor approval and must be consistent with course policy, university policy, and fairness to other students. Approved university

accommodations, religious observances, university-sanctioned activities, and other protected circumstances will be handled according to university procedures.

Student Code of Conduct

All students are expected to abide by University conduct policies as detailed in the following links.

- [Boston University Student Codes of Conduct](#)
- [College of Arts & Sciences Codes of Conduct](#)
- [Boston University Student Responsibilities](#)

Academic Honesty

You may discuss assignments with classmates and consult the Internet, but you must cite your collaborators and sources. To be clear, this includes all use of generative AI. If you are copying, paraphrasing, or adapting the words of someone or something else, you should cite them. For chat-based generative AI, an accessible link to the transcript suffices. However, under no circumstances are you allowed to copy, modify or submit files created by other students.

Regardless of the sourcing and citation, you are responsible for understanding the content that you submit. If you cannot explain your submission to the instructor's satisfaction, credit may be withdrawn at the discretion of the instructor independent of whether appropriate citations were provided.

Cheat sheets, collaboration and other sources will not be allowed during exams. To be clear, any access or interaction with the Internet or AI is forbidden during exams. Any case of academic dishonesty will result in a zero for the entire assignment or exam after following applicable University policies.

Accommodations for Students with Disabilities

From <https://www.bu.edu/disability/>,

Our goal at Disability & Access Services is to provide services and support to ensure that students are able to access and participate in the opportunities available at Boston University. In keeping with this objective, students are expected and encouraged to utilize the resources of Disability & Access Services to the degree they determine necessary. Although a significant degree of independence is expected of students, Disability & Access Services is available to assist should the need arise.

In addition to helping students receive accommodations, we also provide resources to the University community so that events and opportunities can be made accessible.

To make an appointment, please call 617-353-3658. For general inquiries feel free to email access@bu.edu. Please note, emails will be responded to within three business days.

Please reach about new accommodations at least a week beforehand to allow for scheduling and other preparation.