

Syllabus for CIS 606: Analysis of Algorithms

Cleveland State University

Spring 2025

Class Time: MW 6pm-7:15pm	Instructor Office Hour: F 9:00am-1:00pm
Where: BH 302	TA Office Hour: T 2pm-4pm
Instructor: Zhang, Jingru (FH 221)	Email: j.zhang40@csuohio.edu
TA: Xu, Haitao (FH 307)	Email: h.xu12@vikes.csuohio.edu

Course Description

This course provides an introduction to the analysis and designing techniques of efficient algorithms and data structures to solve computational problems. It covers the time and space complexity analysis of algorithms including asymptotic notation, complexity analysis, and solving recurrences, the algorithm design techniques including the divide-and-conquer, prune-and-search, dynamic programming, and greedy strategy, and their applications in solving graph problems, as well as computational complexity concepts.

Course Overview

This course covers topics: asymptotic notations, time complexity analysis, solving recurrences, divide-and-conquer, prune-and-search, dynamic programming, greedy approach, graph algorithms, and computational complexity concepts such as P, NP, NP-Completeness and NP-hard.

Course Learning Objective

- Students will be able to explain the fundamental techniques of algorithm analysis and design;
- Students will be able to describe classical algorithms and their complexity;
- Students will be able to apply the designing techniques to solve related problems.

Course Requirements and Prerequisites

CIS 390 Introduction to Algorithms or equivalent; You are expected to be familiar with the following topics: discrete mathematics (about sets and proof), arrays, linked lists, stacks, queues, heaps, binary search trees, hash tables, sorting algorithms, and basic knowledge on graphs, etc.

Course Materials

Textbook

T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, Introduction to Algorithms, 4th Edition, the MIT Press, Cambridge Massachusetts, 2022.

Others recommended T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, Introduction to Algorithms, 3rd Edition, the MIT Press, Cambridge Massachusetts, 2009.

Course Requirements and Grading Policies

The course grade is based on a student's overall performance through the entire semester. The final grade is distributed among the following components:

Assignments:

Assignment	Percentage of Grade
Tests	50%
Mid Exam	20%
Final Exam	30%

Bug bounty. Please report errors in tests and exams to the instructor verbally or via email. For each such error, the first student to report it receives 1% bonus to their course grade. This bonus cannot exceed 3% total, i.e. three reports.

Point Conversions

Note that the following point conversion is subject to any changes.

Course Format

Tests and Exams: All tests and exams are in-class and submitted before the due (generally, the end of a class).

Letter	Percentage
A	> 90%
A-	> 85%
B+	> 80%
B	> 70%
B-	> 65%
C+	> 60%
C	> 55%
F	>= 0%

Course Policies

Class Participation and Attendance

Students are expected to attend all lectures. Students are excused from attending class if they are participating in officially sponsored university activities, such as athletics, or for observance of religious holidays. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

Missed Tests

For missed tests, everyone is allowed to make up **only one missed** test through the whole semester. Please come to FH 307 during the TA's office hours or make an appointment ahead for other time.

Academic Honesty Policy

Academic misconduct is the conscious attempt to subvert the guidelines of an assessment by using the work or ideas of others without giving them credit for it: submitting work created by someone else, paying for the work of someone else, collaborating with another student to produce work that is not for a group assignment, and using the words or ideas of another without citation constitutes an act of academic dishonesty in the context of this course. I expect all of the written work in this class to be the work of each student alone. In cases of identified academic dishonesty the student will receive a grade of F for the assignment. Further action may also be pursued in accordance with CSU policy on academic integrity. See csuohio.edu/academic-integrity/academic-integrity for CSU Policy on academic misconduct.

IMPORTANT - If you are ever uncertain if actions you are taking count as academic dishonesty, please ask me.

Disability Accommodation

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive academic accommodations should contact CSU's Disability Services for additional information. In order for accommodation requests to be considered for approval, the student is responsible for providing sufficient

documentation of the disability to the office of Disability Services and participating in an interactive discussion with the staff. See the page csuohio.edu/disability/disability for contact information. Accommodations may be requested at any time but are not retroactive. Please contact the office of Disability Services early in the semester for guidance.

Health and Safety Statement

The COVID-19 pandemic is still present. Given the effectiveness and widespread availability of vaccines and boosters, and based on the latest guidelines from the Centers for Disease Control and Prevention (CDC), masks are optional on campus.

1. Vaccination plus a booster shot offers the best protection against serious illness, hospitalization or death from COVID-19. CSU Health and Wellness Services will continue to provide vaccinations by appointment at the Center for Innovation in Medical Professions, Suite 205 (2112 Euclid Avenue). Go to gettheshot.coronavirus.ohio.gov for other locations near you.
2. If you are sick, please stay home and get better before returning to campus.
3. Mental Health If you are experiencing mental health challenges, do not hesitate to reach out to the university Counseling Center at 216-687-2267.

Schedule and Topics

Below is a rough schedule of the course and topics covered. Schedule is subject to change.

Weeks	Topics	Tests
Week 1	Chapter 1-2: Introduction & Running Time Analysis	Test 1
Week 2	Chapter 3: Asymptotic Analysis	
Week 3	Chapter 3: Asymptotic Analysis (Cont.)	Test 2
Week 4	Chapter 4: Divide-and-Conquer	
Week 5	Chapter 4: Divide-and-Conquer (Cont.)	
Week 6	Chapter 4: Solving Recurrences	Test 3
Week 7	Chapter 9: Prune-and-Search	
Week 8	Chapter 9: Prune-and-Search (Cont.)	Mid Exam
Week 9	Chapter 14: Dynamic Programming	
Week 10	Chapter 14: Dynamic Programming (Cont.)	Test 4
Week 11	Chapter 15: Greedy Algorithms	
Week 12	Chapter 15: Greedy Algorithms	Test 5
Week 13	Chapter 20: Graph Algorithms	
Week 14	Chapter 24: Graph Algorithms	Test 6
Week 15	Chapter 34: Computational Complexity Concepts	
Week 16	Final Exam	