



# Applied Data Structures and Algorithms

Charles V. Schaefer, Jr. School of Engineering and Science  
Spring 2026

Instructor: Jingxuan Liu

Canvas Course Address: [CPE593-WS](#)

Course Schedule: Wednesdays 6:00-8:30PM

Contact Info: [jl153@stevens.edu](mailto:jl153@stevens.edu);

Virtual Office Hours: Monday 6:00-7:00PM ET, Thursday 6:00-8:00PM ET

Zoom sessions: On the Canvas class page

Prerequisite(s): CPE552 EE553 or equivalent knowledge of **Java**, C++, or Python

Corequisite(s): N/A

Cross-listed with: NIS-593

## COURSE DESCRIPTION

Applied Data Structures and Algorithms is an intensive introduction to brilliant solutions to classical problems with wide application across computer programming. We will cover data structures, sorting algorithms, searching algorithms, and graph theory. We will also apply these theories to real-world applications. Using great solutions and approaches, programs can be made dramatically more efficient. By knowing the theoretical limits on computation, students will be able to tell when further optimization is impossible.

## STUDENT LEARNING OUTCOMES

After successful completion of this course, students will be able to

1. Analyze programs and algorithms, and determine the complexity of the code.
2. Understand, write, and test data structures.
3. Identify the best/worst/average performance based on algorithmic efficiency.
4. Apply the appropriate data structure and algorithms for a particular purpose.
5. Understand typical techniques, such as recursion, divide-and-conquer, and dynamic programming, in high-performance computation.
6. Gain computer algorithm foundations for future growth and learning.
7. Implement algorithms in Java or Python.
8. Work in teams on problem solving and advanced research topics.

## **COURSE FORMAT AND STRUCTURE**

This course is fully online. To access the course, please visit [stevens.edu/canvas](https://stevens.edu/canvas). For more information about course access or support, contact the Technology Resource and Assistance Center (TRAC) by calling 201-216-5500.

### **Course Logistics**

- We will hold live sessions on Wednesday, 6-8:30 PM. I will post information (online activities, discussion starters, etc.) by Thursday morning. Please check class announcements, modules, assignments, and videos frequently.
- Assignments are due by 11:59 PM EST on the due date listed in the assignment tab.
- Deadlines are an unavoidable part of being a professional, and this course is no exception. Course requirements must be completed and posted or submitted on or before the specified due date and delivery time deadline. Due dates and delivery time deadlines are in Eastern Time (as used in Hoboken, NJ). Please note that students living in distant time zones or overseas must comply with this course time and due date deadline policy. Avoid any inclination to procrastinate. Due dates have been established for each assignment to encourage you to stay on schedule.
- Assignments received more than one week later will receive 0 points.

### **Instructor's Online Hours**

I will be available via email (generally will reply within 24-48Hours). Office hours are the best time to meet me on Zoom and discuss concerns or clarify confusion. Furthermore, there is a specific discussion forum on Canvas that you can use to discuss class related topics with classmates. If you feel you are being neglected in any way, please contact me via email, during office hours, or on class. When emailing me, please place in the subject line the course number/section and the topic of the email (i.e., CPE593 – Assignment 2 Question). This will help me tremendously in locating your emails quicker when I scan the tens of emails that seem to make it into my box each day.

### **Virtual Office Hours**

Virtual Office Hours are a synchronous session (through Zoom) to discuss questions related to weekly readings and/or assignments. Office hours are Mondays 6:00-7:00PM, and Thursdays 6:00-8:00PM, both on ET.

### **Online Etiquette Guidelines**

You are encouraged to comment, question, or critique an idea, but you cannot attack an individual. Our differences, some of which are outlined in the University's inclusion statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambiance. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Allow other students to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language as it could lead to misinterpretation.
- Keep an "open-mind" and be willing to express even your minority opinion.
- Think and edit before you push the "Send" button.

# TENTATIVE COURSE SCHEDULE

Week of	Module	Topic(s)	Readings (CLRS)	Assignment
January 14	Module 00 (Orientation)	Introduction and Course Overview	Syllabus and class canvas	NA
January 21	Module 01	Algorithm and Complexity	Notes CLRS Ch 1	Module 1 HW questions
January 27	Module 02	Arrays, Lists	CLRS Ch 10	Module 2 Programming HW
February 4	Module 03	Stacks, Queues	MAW Ch 3	Module 3 Mini project
February 11	Module 04	Sorting	CLRS Ch 6,7: Sorting	Module 4 HW questions
February 18	Module 05	Trees I	CLRS Ch 12: Binary Search Trees	Module 5 Programming HW
February 25	Module 06	Trees II	CLRS Ch 13: RBTREE CLRS Ch 18: B-Tree	Module 6 Mini project
March 4	Module 07	Hashing	CLRS Ch 11	Module 7 HW questions
March 11	Module 08	Quiz 1	Review	NA
March 18	Spring Recess. No Class			
March 25	Module 09	Searching & Algos	CLRS Ch 14-16	Module 9 Programming. Final project assignment.
April 1	Module 10	Graph Theory I	CLRS Ch 20-22	Module 10 Mini project
April 8	Module 11	Graph Theory II	CLRS Ch 23-24	Module 11 HW questions
April 15	Module 12	Advanced Topics	CLRS Ch 19, 26-29, and 31-35	Final project milestone 1 due
April 22	Module 13	Advanced Topics, NP-Completeness	CLRS Ch 19, 26-29, and 31-35	Module 13 HW questions
April 29	Module 14	Review (video on web)		Final project milestone 2 due
May 6	Module 15	Quiz 2	Review	NA
May 13	Module 15	Final presentations		

# COURSE MATERIALS

## Textbook(s)

Introduction to Algorithms by Cormen, Leiserson, Rivest and Stein 3e/4e

## Other Readings

- 1) Data Structures and Algorithm Analysis in Java by Mark A. Weiss 3e
- 2) Cracking the Coding Interview by Gayle Laakmann McDowell

# TECHNOLOGY REQUIREMENTS

## Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas
- GitHub usage

## Technology skills necessary for this specific course

- Live web conference using Zoom
- Recording a slide presentation with audio narration
- Recording, editing, and uploading videos via Panopto

## Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

# GRADING PROCEDURES

## Grades will be based on:

Assignment Category	Percentage	Submission
Class Participation	5%	Canvas & Zoom
Quizzes (2)	5%	Zoom
Homework Questions (5)	20%	Canvas
Programming Homework (3)	15%	GitHub
Mini Projects (3)	30%	Canvas & GitHub
Final Project	25%	Canvas, GitHub & Presentation

## Grading scales:

93 -100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+

73-76	C
70-72	C-
67-69	D+
63-66	D
60-62	D-
< 60	F

### **Late Policy**

All assignments have due dates. There is a grace period of one week after the specified due date. Submissions are not accepted after the grace period. Assignments submitted between the due date and the end of the grace period will receive 70% of the points earned. For example, if the original full point is 20, the maximum point of a late submission is 14.

- All homework questions (i.e. written homework) will be due in one week.
- All programming assignments will be due in one week.
- All mini projects will be due in two weeks.
- Final project due dates will be specified when the project is assigned.

### **Academic Integrity**

- Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at [www.stevens.edu/provost/graduate-academics](http://www.stevens.edu/provost/graduate-academics).

- Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

### **Generative AI Technologies**

You may use AI programs to help generate code snippets and brainstorm. However, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise

problematic. You should integrate and construct your own final answers and make sure your submissions fit our requirements.

You may not submit any work generated by an AI program as your own. If you include material generated by an AI program, it should be cited like any other reference material (with due consideration for the quality of the reference, which may be poor).

Any plagiarism or other form of cheating will be dealt with under relevant Stevens policies.

### **Undergraduate Honor System**

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at [Honor Code](#)

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

***"I pledge my honor that I have abided by the Stevens Honor System."***

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at [www.stevens.edu/honor](http://www.stevens.edu/honor).

### **Graduate Student Code of Academic Integrity**

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found on the [Graduate Academic Integrity Site](#)

### **Special Provisions for Undergraduate Students in 500-level Courses**

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Provost for Graduate Education or to the Honor Board, who will refer the report to the senior vice provost. The Honor Board Chairman will give the Senior Vice Provost for Graduate Education weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

## **ACCOMMODATIONS**

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other disabilities to help students achieve their academic and personal potential. They facilitate equitable access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/student-diversity-and-inclusion/disability-services>. If you have any questions please contact the Office of Disability Services at [disabilityservices@stevens.edu](mailto:disabilityservices@stevens.edu) or by phone: 201.216.3748.

### **Disability Services Confidentiality Policy**

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

## **INCLUSIVITY**

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

### **Name and Pronoun Usage**

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all

students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your pronouns and/or name, please inform the instructor of the necessary changes.

### **Religious Holidays**

Stevens is a diverse community that is committed to providing equitable educational opportunities and supporting students of all ethnicities and belief systems. Religious observance is an essential reflection of that rich diversity. Students will not be subject to any grade penalties for missing a class, examination, or any other course requirement due to religious observance. In addition, students will not be asked to choose between religious observance and academic work. Therefore, students should inform the instructor at the beginning of the semester if a requirement for this course conflicts with religious observance so that accommodations can be made for students to observe religious practices and complete the requirements for the course.

## **MENTAL HEALTH RESOURCES**

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177), online at <https://stevensportal.pointnclick.com/confirm.aspx>, or in person on the 2<sup>nd</sup> Floor of the Student Wellness Center.

## **EMERGENCY INFORMATION**

In the event of an urgent or emergent concern about your own safety or the safety of someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year-round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at [care@stevens.edu](mailto:care@stevens.edu). A member of the CARE Team will respond to your concern as soon as possible.