

Fall 2023

CS 610: Data Structures and Algorithms

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CS610 Data Structures and Algorithms Syllabus

Semester

Course Modality:

This is an online course, which will be conducted fully online, asynchronously via Canvas. For more information on using Canvas and other supported learning tools, visit the IST Service Desk [Knowledgebase](#).

Instructor Information

Instructor	Email	Office Hours
Ali Mili	mili@njit.edu	Available by appointment via Webex

*I will respond to all emails/Inbox messages within 24 hours. For questions of general interest, please use the “Ask the Instructor Forum” in Canvas. For personal inquiries, please use the instructor’s email address. Assignments and discussions will be graded within a week of being submitted.

General Information

Course Description

Intensive study of the fundamentals of data structures and algorithms. Presents the definitions, representations, processing algorithms for data structures, general design and analysis techniques for algorithms. Covers a broad variety of data structures, algorithms and their applications including linked lists, various tree organizations, hash tables, strings, storage allocation, algorithms for searching and sorting, and a selected collection of other algorithms. Programs are assigned to give students experience in algorithms, data structure design and implementation.

Prerequisites/Co-requisites

CS 114 and CS 241 or equivalents

Course Learning Outcomes

By the end of the course, students will be able to:

1. Deploy specific techniques for the design and analysis of algorithms.
2. Deploy standard algorithms.
3. Apply programming-specific problem-solving techniques.
4. Model real-life situations using data structures and associated operations.
5. Apply elements of discrete mathematics and logic to programming problems.
6. Demonstrate an advanced-level of programming discipline based on logic and problem-solving methodologies.

*Each module will have module-level learning outcomes mapped into the course learning outcomes listed above.

Required Materials

Algorithm Design and Applications.
Michael T Goodrich and Roberto Tamassia.
Wiley, 2015. ISBN: 978-1-118-33591-8

Grading Policy

[NJIT Grading Legend](#)

Final Grade Calculation

Final grades for all assignments will be based on the following percentages:

Textbook assignments: (3x5)	15%
Programming assignments: (3x9)	27%
Discussions	8%
Midterm Exam	20%
Final Exam (covers material of whole term)	30%

Course Work

Textbook Assignments: (3x5=15% of grade) These are typically exercises taken from the textbook, or original exercises pertaining to textbook material. You are usually given two weeks to complete each textbook assignment.

Programming Assignments: (3x9=27% of grade) These are individual programming assignments, testing the student's ability to specify, design, implement and test a programming application. You are usually given three weeks to complete each textbook assignment.

Discussion Forums: (8% of grade) You are expected to participate in weekly discussion forums in Canvas. When all students participate in a discussion, it creates an active

learning environment that will help you better understand the materials and be more successful in the class. You will post their initial response to the prompt by Thursday at 11:59pm and respond to two classmates by Sunday at 11:59pm of the week they are listed.

Midterm Exam: (20% of grade) A midterm exam is administered halfway through the term, and covers all the material discussed in lectures and programming assignments up to the date of the exam. Typical exams include six questions of equal weight, of which students are responsible to answer five; if a student answers all six, the best five grades will be counted. A sample solution will be posted.

Final Exam: (30% of grade) A final exam is administered at the end of the term, and covers all the material discussed in lectures and programming assignments throughout the term. Typical exams include six questions of equal weight, of which students are responsible to answer five; if a student answers all six, the best five grades will be counted. A sample solution will be posted.

*The midterm and final exams will be administered on the specific date/time window indicated in the Course Schedule. You **must** take the exam during that specified time. If you have any conflict, you must inform the instructor by the second week of class.

Feedback

We will endeavor to return graded assignments within a week of the due date in Canvas. We will also endeavor to reply to email queries within 24 hours.

Letter to Number Grade Conversions

This grid is given as an indication of how numeric points are mapped to letter grades. We reserve the right to depart from this table, if needed.

A	90-100
B+	85-89
B	80-84
C+	75-79
C	70-74
F	0-64

Exam Information and Policies

NJIT policy requires that all midterm and final exams must be proctored, regardless of delivery mode, in order to increase academic integrity. Note that this does not apply to essay or authentic based assessments. Effective beginning Fall semester 2019, students registered for a fully online course section (e.g., online or Hyflex mode) must be given the option to take their exam in a completely online format, with appropriate proctoring.

Any course that uses online proctoring for exams may require you to do an environmental scan. You are responsible for selecting a location where you are comfortable with yourself and your room being video and audio recorded. You may be asked to use your camera to scan all four walls of the room you are in, as well as the workspace, desk, and area around the computer. Ideally, your exam environment should be well-lit and free from distractions and interruptions.

This course has a midterm exam and a final exam. The midterm exam is administered mid-semester and covers all the material discussed up to and including the week of the midterm. The final exam covers the material discussed through the whole semester. In this course you will be required to use the following proctoring method to ensure academic integrity for exams:

ProctorU Live+

ProctorU works by connecting you to a proctor who will watch (and listen to) you live, via webcam, while you take your exam. ProctorU is a live online proctoring service that allows you to take your exam from the comfort of your home. ProctorU is available 24/7, however, you will need to schedule your proctoring sessions at least 72 hours in advance to avoid any on-demand scheduling fees.

Creating a ProctorU account is simple. You can do so by visiting go.proctoru.com. In order to use ProctorU, you will need the following:

- [Guardian Secure Proctoring Browser](#) installed on your computer
- High-speed internet connection
- Webcam (internal or external)
- Microphone and Audio (internal or external)
- NJIT ID or Photo-Issued ID
- Reflective surface such as a small mirror
- Windows or Apple Operating System
 - **Important Note:** Students will be required to have an active Windows license on their computer. ProctorU Live supports the following version of Windows:
 - **Minimum OS:** Windows 10 (Windows 10 S mode is not supported) or MacOS 10.13 (Oldest Still Maintained Version)
 - **Recommended OS:** Windows 10 or MacOS 10.15

For more information on preparing for a proctored exam using ProctorU, please click [here](#). Be sure to review the full, step-by-step instructions on creating an account, scheduling an exam, connecting to the proctor, and how you will take your exam using ProctorU. Please click [here](#).

If you do not receive an “invitation” to take a specific exam, you can sign up for an appointment by logging in and searching for the exam by your instructor/course name.

Important: ProctorU recommends that you visit [their testing page](#) to test your equipment prior to your proctoring session. We recommend you click on the button that says "Connect to a Live Person" to fully test out your equipment. You should expect the startup process with the proctor to take about 10-15 minutes. However, this time will not affect your exam time.

Please feel free to direct any questions to the student support team via the live chat within your account. ProctorU Student Support can be contacted via the LiveChat feature location with any ProctorU account, at the Help Center at ProctorU.com, by email (help@proctoru.com), or by calling (855) 772-8678. Additionally, please review the test-taker resource center [here](#).

[More Information and Tips for Ensuring a Smooth Experience](#)

Policy for Late Work

Late submissions are strongly discouraged. A penalty of 33% will be applied for each day late. After three days, no credit can be earned.

Academic Integrity

“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the [NJIT academic code of integrity policy](#).”

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”

Netiquette

Throughout this course, you are expected to be courteous and respectful to classmates by being polite, active participants. You should respond to discussion forum assignments in a timely manner so that your classmates have adequate time to respond to your posts. Please respect opinions, even those that differ from your own, and avoid using profanity or offensive language.

Weekly Expectations

This course is organized into modules. The mapping of modules to weeks varies according to the semester when it is delivered. Each week, students must watch all lecture videos, complete the chapter readings, provide a response to the weekly discussion topic in the class forum by Thursday at 11:59pm and respond to at least two classmates' discussion posts by Sunday at 11:59pm. Students will be given two weeks to complete each textbook assignment and three weeks to complete each programming assignment. Assignments are typically due on Sunday at 11:59 pm, unless otherwise indicated. Finally, this course includes both a midterm and final exam.

Course Schedule

Module	Topic	Reading/Assignment	Due Dates
1	Algorithm Analysis	Read Chapter 1	

Module Topic	Reading/Assignment	Due Dates
	Module 2 Textbook Assignment Assigned	
	Module 1 Discussion	Initial Post-Thursday Peer Reply-Sunday
	Module 1 Extra Practice Problems (Optional)	
2	Basic Data Types	Read Chapter 2, sections 1, 2
	Module 2 Discussion	Initial Post-Thursday Peer Reply-Sunday
	Module 2 Textbook Assignment	Sunday
	Module 2 Extra Practice Problems (Optional)	
3	Trees	Read Chapter 2, section 3
	Module 3 Discussion	Initial Post-Thursday Peer Reply-Sunday
	Module 5 Programming Assignment Assigned	
	Module 3 Extra Practice Problems (Optional)	
4	Binary Search Trees	Read Chapter 3
	Module 4 Discussion	Initial Post-Thursday Peer Reply-Sunday
	Module 4 Extra Practice Problems (Optional)	
5	Balanced BST	Read Chapter 4
	Module 5 Discussion	Initial Post-Thursday Peer Reply-Sunday
	Module 5 Programming Assignment	Sunday
	Module 5 Extra Practice Problems (Optional)	
6	Priority Queues, Heaps	Read Chapter 5
	Module 7 Textbook Assignment Assigned	
	Module 6 Discussion	Initial Post-Thursday Peer Reply-Sunday
	Module 6 Extra Practice Problems (Optional)	
7	Maps and Hash Tables	Read Chapter 6

Module Topic		Reading/Assignment	Due Dates
		Module 7 Discussion	Initial Post-Thursday Peer Reply-Sunday
		Module 7 Textbook Assignment	Sunday
		Module 7 Extra Practice Problems (Optional)	
8	Merge Sort, Quicksort, Lower Bound for Comparison Based Sorting	Read Chapters 8, 9	
		Module 11 Programming Assignment Assigned	Initial Post-Thursday Peer Reply-Sunday
		Module 8 Discussion	
		Module 8 Extra Practice Problems (Optional)	
9	Midterm Exam	Review Chapters 1,2,3,4,5,6,8,9	Midterm Exam-Sunday
10	The Greedy Method	Read Chapter 10	Initial Post-Thursday Peer Reply-Sunday
		Module 10 Discussion	
		Module 10 Extra Practice Problems (Optional)	
11	Divide and Conquer	Read Chapter 11	
		Module 13 Programming Assignment Assigned	
		Module 11 Discussion	Initial Post-Thursday Peer Reply-Sunday
		Module 11 Programming Assignment	Sunday
		Module 11 Extra Practice Problems (Optional)	
12	Dynamic Programming	Read Chapter 12	
		Module 12 Discussion	Initial Post-Thursday Peer Reply-Sunday
		Module 12 Extra Practice Problems (Optional)	
13	Graphs and Graph Traversals	Read Chapter 13	
		Module 13 Discussion	Initial Post-Thursday

Module Topic		Reading/Assignment	Due Dates
			Peer Reply-Sunday
		Module 13 Programming Assignment	Sunday
		Module 13 Extra Practice Problems (Optional)	
14	Shortest Paths in Weighted Graphs	Read Chapter 14	
		Module 15 Textbook Assignment Assigned	Initial Post-Thursday Peer Reply-Sunday
		Module 14 Discussion	Sunday
		Module 14 Extra Practice Problems (Optional)	
15	Minimum Spanning Trees, Maximum Flow, Minimum Cut	Read Chapter 15, 16	
		Module 15 Discussion	Initial Post-Thursday Peer Reply-Sunday
		Module 15 Textbook Assignment	Sunday
		Module 15 Extra Practice Problems (Optional)	
16	Final Exam	Review Chapters 1-16, except 7	Final Exam-Sunday

Additional Information and Resources

Accessibility:

This course is offered through an accessible learning management system. For more information, please refer to Canvas's [Accessibility Statement](#).

Requesting Accommodations:

The Office of Accessibility Resources and Services works in partnership with administrators, faculty, and staff to provide reasonable accommodations and support services for students with disabilities who have provided their office with medical documentation to receive services.

If you are in need of accommodations due to a disability, please contact the [Office of Accessibility Resources and Services](#) to discuss your specific needs.

Resources for NJIT Online Students

NJIT is committed to student excellence. To ensure your success in this course and your program, the university offers a range of academic support centers and services. To learn more, please review these [Resources for NJIT Online Students](#), which include information related to technical support.