

COSC 2430 Data Structures

Fall 2019

MW 1:00 - 2:30 PM, PGH 232

Instructor: [Arjun Mukherjee](#)

Overview

This is a undergraduate level course in data structures. The course is intended for developing foundations in data structures with a focus on solving problems and building core data structures. The broader goal is to understand how data structures are leveraged in problems and tasks that have a relevance to realistic situations. Throughout the course, large emphasis will be placed on tying data structure building techniques, their underlying concept and mathematical constructs to specific applications through hands-on experience.

Administrative details

If class is full or you are a non-CS major, please register as a waitlist student or UHCS undergraduate academic advisor to be added to the waitlist. Depending upon several admin factors if course enrollment is increased, students will be enrolled according to the initial wait list order.

Office hours

Instructor office hours: MW 2:30 - 3.30 PM, PGH 582/301 (please check either offices) or by Appointment (please schedule at 3 days in advance)
TA office hours: Yifan Zhang (aeryen@gmail.com) T:11-1 PGH 301; Marjan Hosseinia (ma.hosseinia@gmail.com) M:11-1 PGH 301

Prerequisites

The course requires background in mathematics and sufficient programming skills. It expects the student has completed COSC 1430 with at least a C grade. Sufficient programming experience is required.

Reading Materials

Textbook:

Goodrich, M. T., Tamassia, R., Goldwasser, M. H. Data Structures and Algorithms in Java. Wiley, 6th edition, 2016.

Required Reference Material:

[Course materials](#) (contains all Lecture notes, slides and a full length sample exam)

[Syllabus](#)

[Math Background for Data Structures \[Chapters 1, 5, 6, 9\]](#).

Grading

Component	Contribution	Due date

HW 1	15%	
HW 2	15%	
HW 3	15%	
HW 4	15%	
HW 5	15%	
Exam 1	30%	12/9, 2-5pm PGH 232
Classwork/Lab	10%	-
Lecture Attendance	5%	-

Rules and policies

Late Assignments: Late assignments will not, in general, be accepted. They will never be accepted if the student has not made special arrangements with me at least one week before the assignment is due. It also needs to be a justifiable reason owing to exacting circumstances. If a late assignment is accepted it is subject to a reduction in score as a late penalty.

Cheating: All submitted work (code, homeworks, exams, etc.) must be your own. If evidence of code sharing is found, you will receive an F grade in the course. Please refer to the student handbook for details on [academic honesty](#).

Statute of limitations: Grading questions or complaints or revaluation, will in general not be attended to beyond one week after the item in question has been returned.

Schedule of topics

Topic(s)	Resources: Readings, Slides, Lecture notes, Papers, etc.
Introduction Course administrivia, semester plan, course goals Java Primer Review of OOP Design Principles	Required Readings: Chapter 1, 2
Fundamental Data Structures The need for data structures Arrays Singly, Circularly, and Doubly Linked Lists	Required Readings: Chapter 3 (3.1, 3.2, 3.3, 3.4)
Algorithm Analysis Basic Concepts of Analysis Functional Growth Rates Asymptotic Analysis Comparative Analysis	Required Readings: Chapter 4 (4.1, 4.2, 4.3)
Recursion Basic Concepts and Examples of Recursion Analyzing and Designing Recursive Algorithms	Required Readings: Chapter 5 (5.1, 5.2, 5.3, 5.4)
Stacks, Queues Basic Concepts and Examples Analyzing and Designing Stacks and Queues	Required Readings: Chapter 6 (6.1, 6.2)

Trees General Trees Binary Trees Tree Traversals Binary Search Trees	Required Readings: Chapter 8 (8.1, 8.2, 8.3), Chapter 11 (11.1)
Priority Queues Priority Queues Heaps and Sorting	Required Readings: Chapter 9 (9.1, 9.2, 9.3, 9.4)
Maps and Hash Tables Maps Hash and Compression Functions	Required Readings: Chapter 10 (10.1, 10.2)
Sorting and Selection Basic Concepts behind Comparative Sorting Merge and Quick Sort	Required Readings: Chapter 12 (12.1, 12.2, 12.3, 12.4)
Graph Algorithms Basic Concepts and Data Structures for Graphs Traversals and Search Shortest Paths and Spanning Trees	Required Readings: Chapter 14 (14.1, 14.2, 14.3, 14.6, 14.7)