

CUNY John Jay College of Criminal Justice
MATH AND COMPUTER SCIENCE

CSCI 373 Advanced Data Structures

Credits: 3

Lecture type

COURSE SYLLABUS

CSCI 373 – section ##

Class Location:

Meeting Days/Time:

Instructor Name:

Email:

Phone:

Office Hours:

Office Location:

TEXT & REFERENCE MATERIAL

Data Structures and Algorithms in C++ (4th edition) by Adam Drozdek

ISBN-13: 978-1-133-60842-4

ISBN-10: 1-133-60842-6

C++ How to Program (10th Edition)

By Paul Deitel & Harvey Deitel

ISBN-13: 978-0-13-444823-7

CATALOG DESCRIPTION

The examination of commonly employed data structures such as stacks and queues will be the objective of the course. In addition, singly and doubly linked lists, hash-coded storage and searching, tree data structures along with the corresponding sorting methods such as heap sort and quick sort will be included. The application of these structures to the creation of data banks for public sector functions as well as the modeling of service facilities such as the courts and document processing agencies will be emphasized.

COURSE REQUIREMENTS

Prerequisites: ENG 101, and CSCI 272 (or MAT 272) or the equivalent.

This course is a core course requirement for both the Computer Science and Information Security and the Applied Mathematics majors.

COURSE OBJECTIVES

Students will be able to:

CO1. Students will be able to describe how to perform an analysis of algorithms to determine best and worst case behavior. (Ch. 2, 5, 6, 9, 10)

CO2. Students will be able to list the most common structures and data formats for storing data in a computer system. (Ch. 3, 4, 6, Deitel Ch. 7)

CO3. Students will be able to discuss the advantages and disadvantages of different data structures/formats. (Ch. 3, 4, 6, 9, 10)

Module	Chapter	Topics	Assignments
1	2	Complexity Analysis (CO1) <ul style="list-style-type: none"> • Computational Complexity (2.1) • Big-O, Ω and Θ Notation (2.2, 2.3, 2.4) 	Assignment 1
2	3	Linked Lists (CO2, CO3) <ul style="list-style-type: none"> • Singly Linked Lists (3.2) • Doubly Linked Lists (3.3) • Circular Lists (3.4) 	Assignment 2
3	4	Stacks and Queues (CO2, CO3) <ul style="list-style-type: none"> • Stacks (4.1) • Queues and Priority Queues (4.2, 4.3) 	
4	Deitel Ch. 7, 21	Arrays, Vectors and Strings (CO2, CO3) <ul style="list-style-type: none"> • Arrays (7.2 – 7.6) • Searching and Sorting Arrays (7.7) • Multidimensional Arrays (7.8, 7.9) • Vectors (7.10) • Strings (21.2 – 21.12) 	Assignment 3
5		Midterm Exam 1	
6	5	Recursion (CO1) <ul style="list-style-type: none"> • Recursive Definitions, Function Calls (5.1 – 5.3) • Tail, Nontail, Indirect, Nested and Excessive Recursion, Backtracking (5.4 – 5.9) 	
7	6	Binary Trees (CO1, CO2, CO3) <ul style="list-style-type: none"> • Binary and Binary Search Trees (6.1 – 6.3) • Breadth-First, Depth-First Traversals (6.4) • Insertion, Deletion (6.5, 6.6) • Balancing, Self-Adjusting Trees (6.7, 6.8) 	Assignment 4

Module	Chapter	Topics	Assignments
		<ul style="list-style-type: none"> • Heaps (6.9) 	
8		Midterm Exam 2	
9	9	Sorting Algorithms (CO1, CO3) <ul style="list-style-type: none"> • Insertion Sort, Selection Sort, Bubble Sort, Decision Trees (9.1, 9.2) • Shell Sort, Heap Sort, Quicksort, Mergesort, Radix Sort (9.3) 	Assignment 5
10	10	Hashing Algorithms (CO1, CO3) <ul style="list-style-type: none"> • Hash Functions (10.1) • Collision Resolution (10.2) • Deletion (10.3) • Perfect Hash Functions, Extendible Files (10.4, 10.5) 	Assignment 6
11		Final Exam	

GRADING

Assignments	40%
Exams	60%

STUDENT INTEGRITY

Statement of the College Policy on Plagiarism

Plagiarism is the presentation of someone else's ideas, words, or artistic, scientific, or technical work as one's own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations require citations to the original source.

Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.

It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentation) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited.

Students who are unsure how and when to provide documentation are advised to consult with their instructors. The Library has free guides designed to help students with problems of

documentation. (*John Jay College of Criminal Justice Undergraduate Bulletin*,
<http://www.jjay.cuny.edu/academics/654.php>, see Chapter IV Academic Standards)