Computer Science Syllabi                                    NJIT Syllabi

Fall 2023

# CS 116: Introduction to Computer Science II in C++

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CS 116 Introduction to Computer Science II in C++
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Office Hours: Friday 2:40 pm – 3:40 pm

## I. COURSE DESCRIPTION:

A study of advanced programming topics with logical structures of data, their physical representation, design, and analysis of computer algorithms operating on the structures, and techniques for program development and debugging. Course covers program specifications, correctness and efficiency, data abstraction, basic aspects of simple data structures, internal searching and sorting, recursion and string processing. Algorithmic analysis is also discussed.

Prerequisite: CS 115

## II. INSTRUCTIONAL MATERIALS:
Required Textbook: Data Structures & Other Objects Using C++, 4th edition.
ISBN: 0-13-212948-5, 978-0-13-212948-0. Authors: Michael Main, Walter Savitch

Reference Book: C++ How to Program, H.M.Deitel and P.J.Deitel, tenth edition, Prentice Hall (Pearson), 2017.

## III. METHODS OF INSTRUCTION

Lectures, labs, projects, exams are used.

## IV. METHODS OF EVALUATING STUDENT ACHIEVEMENT/ PROGRESS:

There will be **six programming projects** distributed roughly every two weeks in the first twelve weeks (counted 55% of your final grade).  There will be **one final exam** (35% of your final grade). Attendance is mandatory (10% of your final grade)

## V. CLASS SCHEDULE

| Topics | Planned Lecture Topics | Read/Project |
|---|---|---|
| Topic 1 | Introduction & Software Development | Ch.1 |
| Topic 2 | ADT & C++Classes | Ch.2.1-2.3, Project 1 |
| Topic 3 | More Classes and Operator Overloading | Ch.2.4-2.6 |
| Lab 1 | Project 1 Help Session | |
| Topic 4 | Container Classes. | Ch. 3 |
| Topic 5 | Container Classes(cont.) | Ch.3, Project 2 |
| Topic 6 | Pointers and Dynamic Arrays(I) | Ch. 4.1-4.2 |
| Lab 2 | Project 2 Help Session | |
| Topic 7 | Pointers and Dynamic Arrays (II) | Ch. 4.2-4.5 |
| Topic 8 | Dynamic Classes and the Big Three | Project 3 |
| Topic 9 | Linked Lists | Ch. 5.1-5.2 Project 4 |
| Lab 3 | Project 3 Help Session | |
| Topic 10 | Building & Using the Linked List Toolkit | Ch. 5.3-5.6 |
| Topic 11 | Software Development Using Templates and Iterators | Ch.6 |
| Topic 12 | Stacks and Queues | Ch. 7, Ch. 8 |
| Lab 4 | Project 4 Help Session | |
| Topic 13 | Introduction to Recursion | Ch. 9.1 Project 5 |
| Topic 14 | Using and Reasoning about Recursion | Ch. 9.2-9.3 |
| Topic 15 | Trees and Traversals | Ch. 10.1- Ch. 10.4 |
| Lab 5 | Project 5 Help Session | |
| Topic 16 | Binary Search Trees and the Bag Class with a BST | Ch. 10.5, |
| Topic 17 | Heaps and Priority Queues | Ch. 11.1, 11.2 |
| Lab 6 | Project 6 Discussion | Ch. 11.3 |
| Topic 18 | In Class Exercise for Tree | |
| Topic 19 | Searching | Ch.12.1-12.2 |
| Topic 20 | Hashing | Ch 12.2-12.4 |
| Topic 21 | Quadratic Sorting | Ch 13.1 |
| Topic 22 | Recursive Sorting, Heap sort | Ch. 13.2- Ch 13.4 |
| Final | Final Exam | |

## VI. Academic Integrity Policy

All course work, including exams, assignments, labs, projects must be done by student themselves. Sharing materials with classmate, especially programming work including logic, and/or modifying the materials to fabricate and reproduce other versions is very seriously treated based on the NJIT University Policy on Academic Integrity.