

Fall 2020

## CS 116-003: Introduction to Computer Science II/C++

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## CS 116 - Intro. to Computer Science II/C++

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**Textbook:** Not required, we will use notes on <https://canvas.njit.edu/students> and online resources.

### Description:

Prerequisites: CS 115 or completion of a required 100 level GUR course in CS, plus an approved CS 105. 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. Students receiving degree credit for CS 116 cannot receive degree credit for CS 505.

The Projects/Quizzes will be done on the computer during lab class. Some of these will be programming projects and some will be online quizzes done in canvas. The split between the projects and quizzes will vary depending on the topics being covered.

If for some reason you cannot attend class, you should make an appointment to see the Dean of Students to obtain an excused absence. Makeup exams quizzes and projects will not be given without an excused absence.

### Grading:

Grades will be based on a midterm and final exam and a set of programming projects and quizzes. The point breakdown for the final average will be:

Midterm:	30%
Final:	35%
Projects/Quizzes:	30%
Discretionary:	5%

## Topics:

Abstract Data Types

Stacks (implemented with arrays and linked lists)

FIFO queue (implemented with circular buffer array and linked list)

Basic sorting (selection, insertion, bubble)

Time Complexity

Abstract classes, Interfaces

Trees

Binary Search Trees

Heaps

Balanced trees (23 tree, red/black tree, Btree)

Tree Traversal

Advanced Sorting (heapsort, mergesort, quicksort)

Graph Algorithms

Minimum Distance (Dijkstra)

Minimal Spanning Tree (Prim, Kruskal)

Graph Coloring (with application to register assignment)

Mark and Sweep

Traveling Salesman

Graph Traversal

The Provost has asked that we include the following statement:

“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 academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

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](mailto:dos@njit.edu)”