**New York University Tandon School of Engineering**

Computer Science

Course Outline CS-GY 6033 Design and Analysis of Algorithms

**Fall 2017**

**Professor Eugene Callahan**

Monday, 6:00 – 8:30 PM; Pfizer Auditorium

To contact professor: ejc369@nyu.edu

Metrotech 2, 10.010

Phone: 646-997-3476

Office hours: Monday and Tuesday, 2-3 PM, or by appointment

Course Pre-requisites

Graduate Standing, CS-GY 5403 and CS-GY 6003.

Course Description

This course reviews basic data structures and mathematical tools. Topics: Data structures, priority queues, binary search trees, balanced search trees. Btrees. Algorithm design and analysis techniques illustrated in searching and sorting: heapsort, quicksort, sorting in linear time, medians and order statistics. Design and analysis techniques: dynamic programming, greedy algorithms. Graph algorithms: elementary graph algorithms (breadth first search, depth first search, topological sort, connected components, strongly connected components), minimum spanning tree, shortest path. String algorithms. Geometric algorithms. Linear programming. Brief introduction to NP completeness.

Course Objectives

To be updated soon.

Course Structure

One lecture and homework each week; pop quizzes; mid-term and final exam.

Readings

The required text for the course is: *Introduction to Algorithms*, Third Edition, Cormen, Leiserson, Rivest, and Stein, MIT Press.

Course requirements

Read all textbook material before class; complete all homework.

Pop quizzes in class: 10% of grade.

Homework: 10% of grade

Mid-term Exam, Approx. 10/18/17, 30% of grade

Final Exam, Approx. 12/20/17, 40% of grade

Course Outline

1. [Introduction](https://gcallah.github.io/algorithms/TheRoleOfAlgorithms.html)
2. [Getting Started](https://gcallah.github.io/algorithms/GettingStarted.html)
3. [Growth of Functions](https://gcallah.github.io/algorithms/GettingStarted.html)
4. [Divide-and-Conquer](https://gcallah.github.io/algorithms/GettingStarted.html)
5. [Heapsort](https://gcallah.github.io/algorithms/Quicksort.html)
6. [Dynamic Programming](https://gcallah.github.io/algorithms/DynamicProgramming.html)
7. [Greedy Algorithms](https://gcallah.github.io/algorithms/GreedyAlgorithms.html)
8. [Binary Search Trees](https://gcallah.github.io/algorithms/BinarySearchTrees.html)
9. [Red-Black Trees](https://gcallah.github.io/algorithms/RedBlackTrees.html)
10. [Augmenting Data Structures](https://gcallah.github.io/algorithms/AugmentingDataStructures.html)
11. [Graph Algorithms](https://gcallah.github.io/algorithms/GraphAlgorithms.html)
12. [Minimum Spanning Trees](https://gcallah.github.io/algorithms/GraphAlgorithms.html)
13. [Hashing](https://gcallah.github.io/algorithms/HashTables.html)

**Moses Center Statement of Disability**

If you are student with a disability who is requesting accommodations, please contact New York University’s Moses Center for Students with Disabilities (CSD) at [212-998-4980](tel:212-998-4980) or [mosescsd@nyu.edu](mailto:mosescsd@nyu.edu).  You must be registered with CSD to receive accommodations.  Information about the Moses Center can be found at [www.nyu.edu/csd](http://www.nyu.edu/csd). The Moses Center is located at 726 Broadway on the 2nd floor.

**NYU School of Engineering Policies and Procedures on Academic Misconduct**

* + 1. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School’s rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School’s Policy on Academic Misconduct.
    2. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:
       - 1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person’s work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
         2. Fabrication: including but not limited to, falsifying experimental data and/or citations.
         3. Plagiarism: intentionally or knowingly representing the words or ideas of another as one’s own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
         4. Unauthorized collaboration: working together on work that was meant to be done individually.
         5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
         6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.