Queens College

**Department of Computer Science**

**Spring 2015**

###### Course Outline CS 313 – Data Structures and Introduction to Algorithm Analysis

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##### Professor’s Information

Prof. Anne Smith-Thompson

# Office Hours: Tuesday / Friday 11:15 – 12:05

email: asmiththompson@qc.cuny.edu

##### Course Content

1. Time and Space Complexity  
    A. Review of *O(g)*   
    B. Evaluating Time Complexity for code fragments
2. Arrays and Lists  
    A. Static vs. Dynamic allocation of memory  
    B. Designing classes using arrays and lists  
    C. Analyzing space complexity for a polynomial class
3. Stacks and Queues  
    A. implementing stacks using arrays and lists  
    B. implementing queues using arrays and lists  
    C. deciding the correct structure for a given problem.

**Test 1**---------------------------------------------------------------------------------

1. Binary Trees  
    A. definitions of binary trees  
    B. methods for general binary trees  
    C. Binary Search Trees  
    D. Balanced Binary Search Trees
2. Heaps (Priority Queues)  
   A. implementation of heaps  
   B. applications of heaps
3. Sorting Algorithms  
   A. MergeSort  
   B. QuickSort  
   C. HeapSort

**Test 2** -----------------------------------------------------------------------------------

1. Graphs  
   A. Implementation of Graphs  
   B. Greedy Algorithms  
    1. Minimum Spanning Trees  
    2. Shortest Path Algorithm
2. Hash Tables will be covered as an independent assignment

**Textbook**:   
Required Text: Weiss, Mark Allen. *Data Structures and Problem Solving Using Java.* 4th edition.

# **Class Notes**

# Lecture topics, Project assignments, and grades will be posted on Blackboard, and programming projects will be submitted via Blackboard or e-mail. Projects may be implemented in either C++ or Java. Each project will include writing a class for the appropriate structure and using that class for your program. There will be 4 major projects during the semester. YOU MUST SUBMIT PROJECTS TO PASS THE COURSE!!!!!

**Quizzes**There will be quizzes (announced and un-announced!) periodically, involving code for basic structures or methods. If you are absent for a quiz, you must contact me and make arrangements to take a make-up by the next class.  
  
**Tests**

There will be 2 tests and a cumulative final exam. Tests will include short answer questions, “design” questions, and writing code (not memorized!)

**Grade Calculation**   
 Quizzes 15%  
 Tests (2) 40%   
 Projects 20%  
 Final 25%

If you are absent for a test or quiz, you must contact me at asmiththompson@qc.cuny.edu and take a make-up by the next class.

Quizzes or tests not made up will be given a grade of 0.

**Attendance Policy**

Attendance is taken at every meeting. Lecture will introduce problem solving concepts as well as coding practices with most classroom code written as pseudo-code. Although credit will not be deducted for (excused) absences, it is difficult to succeed in this course without attending lectures! A failing grade will be issued to any student who fails to submit projects!

# **CODE OF CONDUCT**

In the classroom, respect all members of the class and maintain an environment conducive to learning:

1. Speak to other members of the class in a respectful manner.
2. Come to class on time.
3. Silence all pagers and cell phones.
4. Ask questions to clarify any topics covered in lecture
5. For programming projects, you may discuss ideas or project strategies with other class members. Be helpful to each other, but submit only your own work.
6. Hand in all assignments by their due dates.
7. If you will be absent for a test or quiz, you must contact me at asmiththompson@qc.cuny.edu and take a make-up by the next class.
8. Students must complete their own assignments. Identical assignments will result in no credit for either student, and appropriate actions will be taken.
9. Cheating on a test, quiz, or project will result in a grade of zero and appropriate sanctions.