Instructor: Shahab Raji

Email: shahab.raji@cs.rutgers.edu

Office hours: Tuesday 2-4 PM

TAs:

Ananya Jana	aj611@scarletmail.rutgers.edu	Thursday 9-10 AM
Fan Zhang	fz110@rutgers.edu	Thursday 10-11 AM
Baber Khalid	baber.khalid@rutgers.edu	Monday 4-5 PM

Course Goals: To investigate the essential properties of data structures and algorithms for operating on them; to use these structures as tools to assist algorithm design; to extend exposure to searching, sorting and hashing techniques.

Text: *Data Structures Outside In with Java*
by Sesh Venugopal, 1st Edition, Prentice-Hall.
(Students are responsible for knowing all the material (a lot) that will be covered in class and is NOT in the book.)

Prerequisite Reading: You will be expected to hit the ground running with all the topics you learned in 111 - strings, arrays, searching, sorting, recursion, Big O, objects. In order to review objects and Big O, in particular, you are urged to read the following from the text:

- Chapter 1: Object-Oriented Programming in Java - Sections 1.1 and 1.2
- Chapter 3: Efficiency of Algorithms - Entire chapter, all sections

Eclipse: You will be using Eclipse for all assignments in this class. If you don’t know how to use Eclipse, read the ”Eclipse” page in this site - see the link in the navigation bar on the left.

Class Policy:
Attendance. Watching all video-lectures during the scheduled time is required. The instructor assumes that all students have knowledge of every announcement made during the lectures as well as all material covered.

Exams. There will be one midterm exam and one final exam. They will be timed exams given through Sakai. You will have to write your solution on paper and submit your scanned solution through Sakai. The exams will include material from:

- lectures
- programming assignments
- recitation problems
- quizzes

IMPORTANT: There is NO pre-scheduled general makeup exam. A makeup exam may be given to specific individuals only on the basis of a legitimate, documented conflict, or a university approved reason, or any other emergency that is deemed a legitimate reason for taking a makeup.

Quizzes. Every Tuesday a quiz about the material covered in the lecture will be assigned. The quiz must be turned in through Sakai by 11:55pm of that same day. (No quiz on the first week)

Programming Assignments. There will be five programming assignments. They will be posted on Sakai. Late assignments (less than 2 days) will still be accepted but with a 30% penalty even if they are 1 minute late. After 2 days late assignments will NOT be accepted. You have plenty of time to work in each assignment, and you are responsible for planning and managing your time.

Your best strategy for working on assignments is to start early, and hand in something at least a full day before the deadline. You can continue working on the assignment and submit as many updated versions of your assignment as you want before the deadline.

IMPORTANT:

- You are responsible for making sure the program compiles before you hand it in.
- If it does not compile, your program will get a zero, whatever the reason for it not compiling.
- Note that you are REQUIRED to use Eclipse. If you don't use Eclipse, and you make your program compile by playing around with the package and import statements, it will NOT compile when we test it, and you WILL be given a zero.
- Given the special circumstances of everything being done remotely, it will take some time for the TAs or instructors to answer questions about the assignments. We will do our best to try to answer them as soon as possible but not receiving an answer on time should not be a reason for not turning in your assignment.

Start working early so that if you have questions there will be time for us to answer them.

Regrading. You have one week after the grade of an exam, homework or quiz is released to the class to request a regrade. After that period, the grade becomes permanent and cannot be changed. The grade of the final exam becomes permanent one week after it is released through Sakai.

Recitation problem sets. A problem set will be assigned a couple of days before each recitation. You do not need to submit them for grading. However, I recommend solving the questions every week before the recitation, as the questions in the quizzes and exams will be similar to the problem sets.

Programming Assignments	35
Midterm exam	20
Final exam	35
Quizzes	10

Grading:

The grade assigned as final grade cannot be changed, even by doing additional work. In order to be fair to all students, any option to improve grades (if any) will be given to every student, NOT just to one particular student.

Part I: Linear Structures

(a) Exceptions (1.5)
(b) Running Time (3.2, 3.3, 3.4)
(c) Generic Types
(d) Linked lists (4.5, 4.6)
(e) ArrayList
(f) Stack (7.1, 7.2.1, 7.3, 7.5)
(g) Queue (6.1, 6.3, 6.5)

Part II: Search Structures

(a) Array and Linked List: Sequential Search (4.2)
(b) Sorted Array: Binary Search (5.2, 10.1)
(c) Binary Search Tree (10.2, 10.3, 10.5.1)
(d) Height-balanced BST: AVL tree (10.7.1, 10.7.2, 10.7.3, 10.7.4, 10.7.7)
(e) Hash table (12.1, 12.2, 12.3, 12.4)

Part III: Binary Tree and Applications

(a) Traversals (9.2)
(b) Huffman Codes (9.5.1, 9.5.2, 9.5.3)
(c) Heap (11.1, 11.2, 11.3, 11.7, 13.3.1)

Part IV: Graphs

(a) Graph Representations (14.1, 14.2)
(b) Graph Traversals(14.3)
(c) Graph Algorithms (14.4, 14.6)

Part V: Sorting Algorithms

(a) Insertion sort (13.1)
(b) Quicksort (13.2.1)
(c) Mergesort (13.2.2)
(d) Heapsort (13.3)

The numbers in parentheses are the suggested book sections.

Adjustments to the order of the topics will be made as necessary.

Important Dates:
Midterm: July 7, 2020
Final: August 12, 2020