CISC 3130 Data Structures Fall 2018

Instructor: Ari Mermelstein
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Class meeting hours: Wednesdays 6:30 - 10:00 PM in room 234 NE

Office hour and room: Wednesdays 5:15 - 6:15PM in room 2109N (the CS dept. office)

Required Textbook

Data Structures & Algorithms in JAVA by Goodrich, Tomassia, and Goldwasser 6th edition.
ISBN: 978-1-118-77133-4.

Prerequisite

CISC 3115 - Advanced Programming Techniques

Information most needed from CISC 3115:

1. The difference between primitive types and reference types.
2. What actually happens when you declare a reference to an object.
3. What "new" actually does.
4. Recursion
5. Classes- including:
    - accessors/mutators
    - Constructors
    - method overloading and overriding and the difference between those.
        - In particular, overriding the *toString()* and *equals()* methods.
    - The difference between = = and .equals()
    - Inheritences and polymorphism.
6. Interfaces
    - How to define your own interface
    - How to write a class that implements an interface (both your own and built in ones)

Course Objectives

After successfully completing this course, students will be able to

1. Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, and vectors and be able to use these classes effectively in application programs.

2. Demonstrate ability to use the Java collections' data structures, and understand the advantages and disadvantages of each one, including the applications of the various data structures.

3. Discuss different possible implementations for various data structures in more than one way, compare the different implementations and explain the advantages and disadvantages of the different implementations.

4. Demonstrate understanding of and be able to program various sorting algorithms, and be able to compare the efficiency of these algorithms in terms of both time and space.

5. Trace and code recursive functions, especially those used to implement the data structures discussed above.

Academic Integrity

The faculty and administration of Brooklyn College support an environment free from cheating and plagiarism. Each student is responsible for being aware of what constitutes cheating and plagiarism and for avoiding both. The complete text of the CUNY Academic Integrity Policy and the Brooklyn College procedure for policy implementation can be found at www.brooklyn.cuny.edu/bc/policies. If a faculty member suspects a violation of academic integrity and, upon investigation, confirms that violation, or if the student admits the violation, the faculty member *must* report the violation.

Non-Attendance Because Of Religious Observance

The state law regarding non-attendance because of religious beliefs is on p. 53 in the Bulletin. Please let me know now if you have to miss an exam.

Center for Student Disability Services

In order to receive disability-related academic accommodations students must first be registered with the Center for Student Disability Services. Students who have a documented disability or suspect they may have a disability are invited to set up an appointment with the Director of the Center for Student Disability Services, Ms. Valerie Stewart-Lovell at (718) 951-5538. If you have already registered with the Center for Student Disability Services, please provide your professor with the course accommodation form and discuss your specific accommodation with him/her.

Important Dates For the Fall 2018 Semester

Sunday, September 2 : Last day to add a course.

Monday, September 3: College Closed.

Wednesday, September 5: Conversion Day - Monday Schedule (We will not meet :( )

Monday-Tuesday September 10-11 : No classes scheduled.

Sunday, September 16 : Last day to drop a course without a grade.

Tuesday-Wednesday September 18-19: No classes scheduled.

Monday October 8 : College closed.

Tuesday-Wednesday October 11-12: No classes scheduled.

Tuesday, November 6 : Last day to withdraw from a course with a W (non-penalty) grade

Thursday - Friday November 22-23 : College closed.

Grades

First Test - 25%
Second Test - 25 %
Final Exam- 30%
Homework - 15%
Participation- 5%

Final grade calculation

Your letter grade will be determined as follows:

A+ : 98-100
A : 93-97
A- : 90-92
B+: 87-89
B: 83-86
B-: 80-82
C+: 77-79
C : 73-76
C- : 70 - 72
D+: 67-69
D: 63 - 66
D- : 60 - 62
F : < 60

Exam Dates - Tentative
The first exam will be held on Wednesday October 17.
The second exam will be held on Wednesday November 28.
The final exam (not tentative) will be held on Wednesday December 19, 2018 from 6-8PM (**NOT 6:30PM!!)** , Room TBA.

Homework

Homework will be assigned every 1-2 weeks, and you will typically have 2 weeks to complete assignments. Assignments will typically include multiple files. You may use any operating system you like. Please don't email .class files just code.
Homework must be emailed to the homework email address, with the subject line:

Homework # <number> - <Full name>

When you submit your homework, you should get an automated message saying “Homework submitted.” Please hold on to this receipt in case there’s a dispute over me receiving your homework. Please don’t zip your files together.

The homework assignments will be graded out of 10, with 1 point deducted for each week late.

Topics List

1. Review of CISC 3115.
2. A rational number class and how generics work.
3. What the Java Collections hierarchy is.
4. The built-in ArrayList class and its methods.
5. The Iterator and Iterable interfaces; iterators for the ArrayList class.
6. Creating our own MyList interface.
7. Implementing our own MyArrayList class that implements the MyList interface.
5. Algorithm Analysis and Big Oh Notation.
6. The built-in LinkedList class and its methods.
    - why for LinkedLists iterators are essential.
7. Implementing our own MyLinkedList class
    - A ListNode class.
    - how to link these nodes into a linked list structure.
    - how to write methods to insert, remove, and print all nodes in a linked list.
    - doubly linked lists and the full MyLinkedList class.
8. A different approach for Lists -- Abstract classes.
9. Stack and Queue interfaces
    - Specifying Stack and Queue interfaces and implementing our own classes that implement them.
10. Using the built-in Deque interface and its associated implementation classes.
11. Using the built-in PriorityQueue class and its methods.
12. Implementing a priority queue.
    -what a minimum heap is and how to implement it.
    - how to implement the methods insert() and removeMax().
13. Sorting algorithms and their complexities
14. A MySet interface and the HashSet and TreeSet classes.
15. A MyMap interface and the HashMap and TreeMap classes.
16. Implementing maps and sets
    - Binary search trees
    - Hash Tables.
16. Graphs and Graph traversals.