CISC 3130 Data Structures Fall 2016

Instructor: Ari Mermelstein
Email address for questions: mermelstein AT sci DOT brooklyn DOT cuny DOT edu
Email address for homework submissions:
mermelstein DOT homework AT gmail DOT com

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 with C++ Using STL Second Edition by William Ford and William Topp.
ISBN: 01308580-1.

Prerequisite

CISC 3110 - Advanced Programming Techniques

Information most needed from CISC 3110:

1. How to allocate, use, and deallocate memory from the heap
2. Pointer arithmetic
3. Recursion
4. Classes- including:
    - accessors/mutators
    - Constructors / Destructors
    - Copy constructors/default constructors
    - operator overloading

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 STL 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 2016 Semester

Wednesday, August 31 : Last day to add a course

Saturday - Monday September 3-5 : No classes scheduled.
Wednesday, September 14 : Last day to file for elective course Pass/Fail
Thursday, September 15 : Last day to drop a course without a grade.

Sunday - Tuesday October 2-4 : No classes Scheduled
Thursday, October 6 : Last day to apply for Fall 2016 Graduation

Monday October 10 : College closed.

Tuesday-Wednesday October 11-12: No classes scheduled.
Friday, October 14 : Conversion Day; Classes follow a Monday Schedule
Thursday, November 10 : Last day to resolve Spring and Summer 2016 incomplete grade (INC) Last day to withdraw from a course with a W (non-penalty) grade

Thursday - Friday November 24-25 : College closed.

Saturday-Sunday November 26-27 : No classes scheduled.

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 5.
The second exam will be held on Wednesday November 23.
The final exam (not tentative) will be held on Wednesday December 14, 2016 from 6-8PM, 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, but please don't rely on system dependencies. (I.e. #include all files that are necessary, whether or not it compiles or works without it.) Please don't email executable 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 3110.
2. The MyArray class
3. The STL vector template class
    - different constructors and their uses
    - the vector operations push_back(), operator[], and pop_back().
    - uses for vectors
4. Implementing a vector class
5. Algorithm Analysis and Big Oh Notation.
6. The STL list template class.
    - different constructors and their uses
    - the list operations push_back(), push_front(), pop_back(), pop_front().
    - list iterators to go through a list.
    - uses for lists.
7. Implementing a list class
    - list node structures
    - how to link these nodes into a linked list structure.
    - how to write functions to insert, remove, and print all nodes in a linked list.
    - doubly linked lists.
8. STL stacks and queues
    - operations push(), pop(), empty(), and what these operations do
    - uses for stacks and queues.
9. Implementing stacks and queues
10. STL priority queues
    - operations push(), pop(), empty(), and what these operations do.
    - uses for priority queues.
11. Implementing a priority queue.
    -what a maximum heap is and how to implement it.
    - how to implement the functions insert() and removeMax().
12. Sorting algorithms and their complexities
13. STL set template class.

-the set operations insert(), find(), and erase().
- uses for sets.

14. STL map template class.
    - the map operation [ ] for lookups and inserts.
15. Implementing maps and sets
    - Binary search trees
    - Hash Tables.
16. Graphs and Graph traversals (time permitting).