Boston University Metropolitan College

Data Structures Using C++

CS 341 A1, Fall 2022
Course Format: On-Campus Face-to-Face
Rev 1

Instructor: John S. Maslanka, Ph.D.   **Classroom: SHA-210**
Wednesday Evenings, 9/7 – 12/14/2022, 6:00 PM – 8:45 PM,   except 11/23/2022 Thanksgiving
email: maslanka@bu.edu   Department phone: 617-353-2566
Office hours: before class or by appointment   Mobil phone: 339-364-0442

Course Description

The student is expected to gain an Object-Oriented understanding of Data Structures using the C++ Programming Language. Topics include data abstraction, encapsulation, information hiding, the use of recursion, creation and manipulation of various data structures including searching and sorting algorithms, lists, stacks, queues, hashing, trees, and graphs. Programming methods for accessing these structures are at the heart of understanding the subject matter of this course. Students are encouraged to bring their laptops to class and to assist in the development and enhancement of course materials.

Preliminary Expectations:

All students have successfully completed MET CS 231 or the equivalent in an academic environment. Also, all students are expected to be acquainted with the usage of a full-capability IDE such as MS Visual Studio, Oracle NetBeans, IBM Eclipse, or MacOS XCode.
Homework assignments are to be completed on a system such as Windows-10 or later, or a UNIX or linux-based system or Apple OS system which supports the ANSI-15 or later Standard version of C++. The current standardized version of C++ is version 20, which was ratified and published in December, 2020. All students are expected to participate in class discussions.

TextBooks:
- **Instructor's Chapters and Programs on Blackboard.** (See Courseware below.)

References:
- **Introduction to Programming in C++**, edition 1, by John Maslanka, publisher Kendall-Hunt, 2009, ISBN 978-0-75475-6465-7.
- **C++ How To Program**, 10th edition or later, by Harvey and Paul Deitel, Pearson, ISBN 978-0-13-4448237, 2014.

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Courseware:
Online **Blackboard** will be used in conjunction with this course. The CS341 Fall 2022 website will be self-enrolling and you are expected to review its contents frequently.

Course Policies
1) Attendance & Absences – All students are expected to attend every class. Please inform the instructor by email or phone as soon as possible if you need to be absent from a class. The student is expected to make up all work from the missed class or classes including class notes, exams and homework assignments.
2) Assignment Completion and Late Work – All homework assignments are due on the dates specified in the attached course calendar. The Midterm exam will be a takehome exam and will be made available on Blackboard on the date specified in the course calendar. It will be due on the due date specified in the calendar. The Final Exam will be given in class on the Wednesday date during the Final Exam period of the semester, which is specified in the course calendar below. All other course work and assignments are required to be completed and submitted prior to the Final Exam.
3) **Code of Academic Conduct** – Academic Integrity is required of all students. Cheating and plagiarism will not be tolerated in any Metropolitan College course. Such actions will result in no credit for the assignment or examination and may lead to other disciplinary actions. Please review the Student Academic Conduct Code which can be found at the following URL: http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.

The Academic Code of Conduct should not be understood as a discouragement for discussing the course material or your particular approach to a problem solution with other students in the class or from forming and participating in study groups. On the contrary – you may share your thoughts, questions and solutions with your classmates. Nevertheless, if you choose to work in a group, you as the individual student will be expected to produce your own original solutions to homework and exam problems. Also, you will be expected to document the usage of any work by another person including myself, other students, or any other widely available source, such as the internet or any hard-copy literature.

Grading Criteria:
Midterm Exam: 25%, Final Exam 25%, Assigned Homework Problems: 50%. There will be four homework/lab assignments, for which the due dates are specified in the course calendar. Additional assignments will be made available on a per-request basis. The problem statements for these assignments will require the approval of the Professor. The students will email their completed **source.cpp** and **source.h** files for their homework problem solutions, as well as Midterm and Final Exam, to the professor at maslanka@bu.edu. This will protect you because BU IT retains copies of all emails which pass through their systems. All homework assignments and the Midterm should be emailed to the professor prior to 6:00PM on the due dates listed in the course calendar.

Dr. Maslanka is a professional writer of computer language compilers and run-time systems. He is retired from Hewlett Packard Company/Compaq Computer Corporation/ Digital Equipment Corporation, having worked in their Marlboro, MA, and Nashua, NH, facilities from 1975 to 1984 and from 1991 until his retirement in 2002. Also, he has been Adjunct Faculty in the BU MET CS Department since 1973.

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Course Calendar

Dates	Topics and Readings	Assignments
Sep 7	**Course Introduction and Overview of Topics. Keyboard Input and Testing. Programming Guidelines.** Preface, Chapter 1, Appendixes A, B	**Homework Statement 1 available**
Sep 14	**Bubble Sort, Selection Sort; Recursion, Pointers; References, Dynamic Arrays.** Chapters 2 thru 5	Homework 1 due in email
Sep 21	**MergeSort** Chapter 6	Homework 2 Statement available
Sep 28	**Programmatic Efficiency and Big-O notation;** Chapter 7, Appendix C None	
Oct 5	**Elementary Linked Lists – Stacks, Bags.** Chapter 8	Midterm Exam available
Oct 12	Spring Break – No Class	None
Oct 19	**Container class with Singly Linked List.** Chap 8 cont.	Midterm Exam due in email
Oct 26	**Doubly Linked Lists – Queues;** Chapter 8 cont. **Aggregation, Hashing**	**Homework 3 statement available**
Nov 2	**Template functions and classes;** Appendix D **STL Standard Template Library classes.**	**None**
Nov 9	**Binary Trees – Intro, Building Binary Trees, Traversals and Searches. Chapter 9**	Homework 3 due in email
Nov 16	**Binary Trees – AVL Balancing.** Chapter 9 cont. **Deleting an element of a Tree**	**Homework statement 4 available**
Nov 23	**No Class – Thanksgiving Holiday**	**None**
Nov 30	**Graphs – Adjacency Matrixes and Breadth Traversls using Dynamic Arrays.** Chapter 10.	**None**
Dec 7	**Graphs -- Depth Traversals, Stacked Dynamic Arrays. Review for Final Exam.** Chapter 10 cont.	**Homework 4 due in email**
Dec 14	Final Exam 6:00 PM - 8:00 PM in class. Also, all assignments due by 8:45 PM	