BOSTON UNIVERSITY

Data Structure with Java

MET CS342 (On Campus)

Vijai Diwania vijaid@bu.edu Office hours: After lecture or send an email with your request

Course Description

This course covers data structures using the Java Programming Language. Topics include data abstraction, encapsulation, information hiding, and the use of recursion, creation and manipulation of various data structures: lists, queues, tables, trees, heaps, and graphs, and searching and sorting algorithms. Laboratory course. Effective Fall 2020, this course fulfills a single unit in each of the following BU Hub areas: Quantitative Reasoning II, Creativity/Innovation, Critical Thinking. Prerequisite: MET CS232 or instructor's consent.

Books

Michael Main "Data Structures & Other Objects Using Java™", Fourth Edition, Prentice Hall, 2012 (Required Text Book)

This book can be purchased from Barnes and Noble at Boston University <u>https://bu.bncollege.com/</u>. Also available at Pearson <u>www.pearsonhighered.com</u>.

Courseware

Blackboard site: onlinecampus.bu.edu or learn.bu.edu

Course Policies

- 1) Attendance & Absences Attendance is required. If you cannot make it for planned reasons, please let your instructor know.
- 2) Assignment Completion & Late Work Do your own work. Discussion of approach to problems with other students is encouraged, but the actual work on a project and assignment should be of an individual nature. No copying and assistance from other sources. Submit your work to the course website on-time. Late submission without permission or legit reason might bring penalty.
- 3) Academic Conduct Code Cheating and plagiarism will not be tolerated in any Metropolitan College course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the Student Academic Conduct Code:



http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/cod e.html. This should not be understood as a discouragement for discussing the material or your particular approach to a problem with other students in the class. On the contrary – you should share your thoughts, questions and solutions. Naturally, if you choose to work in a group, you will be expected to come up with more than one and highly original solutions rather than the same mistakes.

Grading Criteria

Assignments: 20% Quizzes: 25% Term Project: 25% Final Examination: 30%

This course is an intensive analysis of Software Engineering "tools". The student should be prepared to spend sufficient time and energy on this course to allow for successful completion of the course work.

The intent of this course is to allow the student to learn to build data structures. Under no circumstances, already existing data structures (non-student created) should be used in any assignments. No collection types from java.util.* should be used. Use of packages such as ArrayList, HashMap, LinkedList, Dictionary, Stack, etc. will result in failure of assignments. Use of facilities in Java.util.*, such as Scanner, Random, etc. is allowed.

Class Meetings, Lectures & Assignments

Lectures, Readings, and Assignments subject to change, and will be announced in class as applicable within a reasonable time frame.

<u>Week</u>	<u>Classroom</u> Lecture Date	<u>Topic</u>	<u>Reference</u>	<u>Work Due</u>
1	09-Sep	Introduction, Administrative Issues. Software Design, Tools (Compilers, IDEs, etc.), Runtime analysis, Big O Notation, Test and Debugging. Java Review, Methods, expressions, control flow. Classes, Packages, Parameters.	Chapters 1, 2	
2	16-Sep	Collection Classes - Methods, Static vs. Dynamic objects,	Chapter 3	
3	23-Sep	Linked Lists – Arrays, Bag Abstract Data Type, Nodes, Node tools, and Linked List Tools	Chapter 4	Assignment 1 and Quiz 1

Classroom lectures are on Mondays 6:00-8:45 PM in the CAS building, room 222.



4	30-Sep	Generics – Wrapper Classes, and Autoboxing. Generic Classes, Generic Nodes, Interfaces, and Iterators	Chapter 5	
5	07-Oct	Stacks – Introduction, Applications, Abstract Data Types, Array-based, Linked-list Based Stacks	Chapter 6	Assignment 2 and Quiz 2
6	12-Oct (Online, Time: TBD)	Queues – Introduction, Applications Abstract Data Types. Linked Queue implementations, array-based queue implementations.	Chapter 7	
7	21-Oct	Recursive Thinking - Examples, theory implementations of recursion.	Chapter 8	Assignment 3 and Quiz 3
8	28-Oct	Trees – Binary Trees, Linked and Array based representations Traversals, In-Order, Pre- Order, Post Order	Chapter 9	
9	04-Nov	Searching – Serial searching, Binary searching, Open Address Hashing, Chained Hashing	Chapter 11	Assignment 4 and Quiz 4
10	11-Nov	Sorting – Quadratic Sorting Algorithms, Recursive Sorting Algorithms, Heaps	Chapter 12	
11	18-Nov	Graphs – Directed, and undirected Graphs, Dijkstra's Shortest Path Algorithm.	Chapter 14	Assignment 5 and Quiz 5
12	25-Nov	Lab Work - 1		
13	02-Dec	Lab Work - 2		Assignment 6 and Quiz 6
14	09-Dec	Term Project Presentations & Course Review		Term Project
15	16-Dec	Final Exam		Final Exam

Rev: 8/25/2024 Note: This syllabus is subject to change.