

# Data Structures with Java

MET CS 342 A1/EX Course Format - Learn from Anywhere, Offered Simultaneously On Campus and Remote Fall 2020

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Class Time: Monday - 6:00 p.m. – 8:45 p.m. Class Location: SOC B57

#### **Course Description**

This course is designed to familiarize and instruct students in the concepts of data structures, data abstraction, information hiding, and software interaction, as utilized in software engineering. The course will describe the concepts listed above and will demonstrate their usage in modern software engineering, with Java. An emphasis is placed on the implementation of these techniques and the management of their usage.

### Text

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

Courseware http:// learn.bu.edu

#### Fall 2020 COVID-19 Policies

**Classroom Rotations:** [for courses with rooms that cannot accommodate the all students wanting to meet in-person] Classrooms on campus have new capacities that follow guidelines issued by state and local health and government authorities related to COVID-19 and physical distancing. Before the beginning of the class, and throughout the semester, I will be reaching out to students who have indicated that they want to attend the classroom in-person. Our classroom hold [] students, and therefore we will have [two] rotations of students that come to class on campus alternate weeks. You will be asked to attend remotely on the week that you have rotated out the classroom.



**Compliance:** All students returning to campus will be required, through a digital agreement, to commit to a set of <u>Health Commitments and Expectations</u> including face coverings, symptom attestation, testing, contact tracing, quarantine, and isolation. The agreement makes clear that compliance is a condition of being a member of our on-campus community.

You have a critical role to play in minimizing transmission of COVID-19 within the University community, so the University is requiring that you make your own health and safety commitments. Additionally, if you will be attending this class in person, you will be asked to show your <u>Healthway</u> badge on your mobile device to the instructor in the classroom prior to starting class, and wear your face mask over your mouth and nose at all times. If you do not comply with these rules you will be asked to leave the classroom. If you refuse to leave the class, the instructor will inform the class that they will not proceed with instruction until you leave the room. If you still refuse to leave the room, the instructor will dismiss the class and will contact the academic Dean's office for follow up.

Boston University is committed to offering the best learning environment for you, but to succeed, we need your help. We all must be responsible and respectful. If you do not want to follow these guidelines, you must participate in class remotely, so that you do not put your classmates or others at undue risk. We are counting on all members of our community to be courteous and collegial, whether they are with classmates and colleagues on campus, in the classroom, or engaging with us remotely, as we work together this fall semester.

## **Class Format and Grading Policy Policies**

New material will be presented in weekly lectures. Reviews, exercises, and homework solutions will be covered during lectures. Student participation is highly recommended, although not mandatory, and it is possible for participation to lead to extra credit.

Weekly (more or less) Homework problems will be assigned, in addition to 3 programming assignments. Homework will be assigned weekly and is due the following week. Late homework and programs will not be accepted unless permission by the instructor was granted prior to the due date. A mid-term and final exam will be completed in class, and the breakdown of grading for the course is as follows:



Homework:	15%
Programming Assignments:	45% (1 <sup>st</sup> 10%, 2 <sup>nd</sup> 15%, 3 <sup>rd</sup> 20%)
Mid-term Exam:	15%
Final Exam:	25%

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 should (non-student created) already existing data structures 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.

Academic Conduct Code – Work handed in by students should be of that student's design. Discussion of approach to problems with other students is encouraged, but the actual work on a project should be of an individual nature. 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/code.html.

#### **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>	Topic	Reference
(1)	14 Sep 20	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)	21 Sep 20	Collection Classes - Methods, Static vs. Dynamic objects,	Chapter 3
(3)	28 Sep 20	Linked Lists – Arrays, Bag Abstract Data Type, Nodes, Node tools, and Linked List Tools	Chapter 4
(4)	5 Oct 20	Generics – Wrapper Classes, and Autoboxing. Generic Classes, Generic Nodes, Interfaces, and Iterators	Chapters 5
(5)	13 Oct 20	TUESDAY! - Stacks – Introduction, Applications, Abstract Data Types, Array-based, Linked-list Based Stacks	Chapter 6
(6)	19 Oct 20	Queues – Introduction, Applications Abstract Data Types. Linked Queue implementations, array-based queue implementations.	Chapters 7
(7)	26 Oct 20	Data Structures coding demonstration. Review for Midterm.	
(8)	2 Nov 20	Midterm Exam	
(9)	9 Nov 20	Recursive Thinking - Examples, theory implementations of recursion.	Chapter 8
(10)	16 Nov 20	Trees – Binary Trees, Linked and Array based representations Traversals, In-Order, Pre-Order, Post Order	Chapters 9
(11)	23 Nov 20	Searching – Serial searching, Binary searching, Open Address Hashing, Chained Hashing	Chapter 11
(12)	30 Nov 20	Sorting – Quadratic Sorting Algorithms, Recursive Sorting Algorithms, Heaps	Chapter12
(13)	7 Dec 20	Graphs – Directed, and undirected Graphs, Dijkstra's Shortest Path Algorithm. Review for Final.	Chapter14
(14)	14 Dec 20	Final Exam	

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This syllabus is subject to change