Syllabus

This is a single, concatenated file, suitable for printing or saving as a PDF for offline viewing. Please note that some animations or images may not work.

Course Description

This module is also available as a concatenated page, suitable for printing or saving as a PDF for offline viewing.

MET CS526

Data Structures and Algorithms

This course covers and relates fundamental components of programs. Students use various data structures to solve computational problems, and implement data structures using a high-level programming language. Algorithms are created, decomposed, and expressed as pseudocode. The running time of various algorithms and their computational complexity are analyzed.

Prerequisites: MET CS300 and either METCS520 or MET CS521. Or instructor consent.

Technical Note

The table of contents expands and contracts (+/- sign) and may conceal some pages. To avoid missing content pages, you are advised to use the next/previous page icons in the top right corner of the learning modules.

This course requires you to access files such as word documents, PDFs, and/or media files. These files may open in your browser or be downloaded as files, depending on the settings of your browser.

Learning Objectives

By successfully completing this course, you will be able to do the following:

- Describe and illustrate fundamental data structures.
- Use fundamental data structures to support the implementation of algorithms.
- Given a problem definition, develop an algorithm to solve the problem.
- Write an algorithm using a pseudocode.
- Illustrate the execution of the pseudocode of an algorithm using a sample input.
- Analyze the performance of an algorithm.
- Implement a given algorithm using a high-level programming language.
- Solve computational problems using algorithms.

Instructor

Vineet Raghu, Ph.D

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Metropolitan College

Boston University

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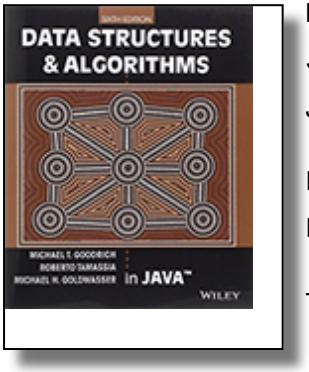
Dr. Vineet Raghu is an Instructor of Radiology at the Massachusetts General Hospital and Harvard Medical School and a part-time lecturer at BU MET CS. His research focuses on the use of deep learning to measure aging and predict risk of major age-related chronic disease from common medical imaging, genetics, and genomic data. His current research projects aim to 1) estimate risk of death, chronic lung disease, and cardiovascular disease from x-rays of the chest, 2) estimate risk of cardiovascular disease from pictures of the back of the eye, and 3) estimate aging from whole-body x-ray scans and genetics.

Vineet obtained his bachelor's degree in Computer Science and Mathematical Biology and his Ph.D. in Computer Science from the University of Pittsburgh. He served as a teaching assistant for six undergraduate courses

during his graduate program.

Materials

Required Book



Michael T. Goodrich, Roberto Tamassia, and Michael T. Goldwasser (2014). ***Data Structures and Algorithms in Java*** **– 6th Edition**.
John Wiley & Sons

ISBN-13: 978-1118771334
ISBN-10: 0123814790

This book can be purchased from Barnes and Noble at Boston University.

Tools Requirements

1. Broadband Internet
2. PC, Mac, or Linux with comfortable screen size for editing source code
3. Internet Browser (Firefox, Chrome, Free Download)
4. A Zip Compression Utility
5. PDF Reader (Adobe Reader or Foxit Reader, Free Download)
6. An Integrated Development Environment (IDE) recommended (any IDE is OK), but not required
7. Java Development kit (JDK) (Free Download)

Boston University Library Information

Boston University has created a set of videos to help orient you to the online resources at your disposal. An introduction to the series is below:

met_ode_library_14_sp1_00_intro video cannot be displayed here

All of the videos in the series are available on the Online Library Resources page, which is also accessible from the Ca.m.pus Bookmarks section of your Online Ca.m.pus Dashboard. Please feel free to make use of them.

As Boston University students, you have full access to the BU Library. From any computer, you can gain access to anything at the library that is electronically formatted. To connect to the library, use the link http://www.bu.edu/library. You may use the library's content whether you are connected through your online course or not, by confirming your status as a BU community member using your Kerberos password.

Once in the library system, you can use the links under "Resources" and "Collections" to find databases, eJournals, and eBooks, as well as search the library by subject. Some other useful links follow:

Go to Collections to access eBooks and eJournals directly.

If you have questions about library resources, go to Ask a Librarian to email the library or use the live-chat feature.

To locate course eReserves, go to Reserves.

Please note that you are not to post attachments of the required or other readings in the water cooler or other areas of the course, as it is an infringement on copyright laws and department policy. All students have access to the library system and will need to develop research skills that include how to find articles through library systems and databases.

Free Tutoring Service

Free online tutoring with Smarthinking is available to BU online students for the duration of their courses. The tutors do not rewrite assignments, but instead teach students how to improve their skills in the following areas: writing, math, sciences, business, ESL, and Word/Excel/PowerPoint.

You can log in directly to Smarthinking from Online Campus by using the link in the left-hand navigation menu of your course.

YouTube

Please Note

Smarthinking may be used only for current Boston University online courses and career services. Use of this service for purposes other than current coursework or career services may result in deactivation of your Smarthinking account.

Study Guide

This course starts on a **Monday**. The modules in this course run from **Monday to Sunday**.

Module 1 Study Guide and Deliverables

Topics:	• Java Basics Review • OO Design • Fundamental Data Structures • Basic Math Facts
Readings:	• Module 1 online content • Textbook: Chapter 1, Chapter 2, Chapter 3, Appendix A
Assignments:	• Assignment 1 due **Tuesday, March 22 at 6:00 AM ET**
Assessments:	• Quiz 1 due **Tuesday, March 22 at 6:00 AM ET**

Live Classrooms:	• **Tuesday, March 15 from 8:00-9:30 PM** • **Thursday, March 17 from 8:00-10:00 PM** • Another one-hour live office hour session led by your facilitator: TBD

Module 2 Study Guide and Deliverables

Topics:	• Algorithm Analysis • Recursion • Stacks and Queues
Readings:	• Module 2 online content • Textbook: Chapter 4, Chapter 5, Chapter 6
Assignments:	• Assignment 2 due **Tuesday, March 29 at 6:00 AM ET**
Assessments:	• Quiz 2 due **Tuesday, March 29, at 6:00 AM ET**
Live Classrooms:	• **Tuesday, March 22 from 8:00-9:30 PM** • **Thursday, March 24 from 8:00-10:00 PM** • Another one-hour live office hour session led by your facilitator: TBD

Module 3 Study Guide and Deliverables

Topics:	• Lists • Trees
Readings:	• Module 3 online content • Textbook: Chapter 7, Chapter 8
Assignments:	• Assignment 3 due **Tuesday, April 5 at 6:00 AM ET**
Assessments:	• Quiz 3 due **Tuesday, April 5 at 6:00 AM ET**
Live Classrooms:	• **Tuesday, March 29 from 8:00-9:30 PM** • **Thursday, March 31 from 8:00-10:00 PM** • Another one-hour live office hour session led by your facilitator: TBD

Module 4 Study Guide and Deliverables

Topics:	• Priority Queues and Heaps • Maps and Hash Tables
Readings:	• Module 4 online content • Textbook: Chapter 9, Chapter 10 (except 10.4)
Assignments:	• Assignment 4 due **Tuesday, April 12 at 6:00 AM ET**
Assessments:	• Quiz 4 due **Tuesday, April 12 at 6:00 AM ET**
Live Classrooms:	• **Tuesday, April 5 from 8:00-9:30 PM** • **Thursday, April 7 from 8:00-10:00 PM** • Another one-hour live office hour session led by your facilitator: TBD

Module 5 Study Guide and Deliverables

Topics:	• Search Rrees • Sorting and Selection • Huffman Code and Greedy Algorithm • Dynamic Programming
Readings:	• Module 5 online content • Textbook: Chapter 11 (11.1, 11.2, 11.3), Chapter 12, Chapter 13 (13.4, 13.5)
Assignments:	• Assignment 5 due **Tuesday, April 19 at 6:00 AM ET**
Assessments:	• Quiz 5 due **Tuesday, April 19 at 6:00 AM ET**
Live Classrooms:	• **Tuesday, April 12 from 8:00-9:30 PM** • **Thursday, April 14 from 8:00-10:00 PM** • Another one-hour live office hour session led by your facilitator: TBD

Module 6 Study Guide and Deliverables

Topics:	• Graph Algorithms • Computational Complexity
Readings:	• Module 6 online content • Textbook: Chapter 14 (except 14.4)
Assignments:	• Assignment 6 due **Tuesday, April 26 at 6:00 AM ET** • Term Project due **Tuesday, April 26 at 6:00 AM ET**
Assessments:	• Quiz 6 due **Tuesday, April 26 at 6:00 AM ET**
Course Evaluation:	Course Evaluation opens on **Monday, April 18, at 10:00 AM ET** and closes on **Monday, April 25, at 11:59 PM ET**. Please complete the course evaluation. Your feedback is important to MET, as it helps us make improvements to the program and the course for future students.
Live Classrooms:	• **Tuesday, April 19 from 8:00-9:30 PM** • **Thursday, April 21 from 8:00-10:00 PM** • Another one-hour live office hour session led by your facilitator: TBD

Final Exam Details

The Final Exam is a proctored exam available from **Wednesday, April 27 at 6:00 AM ET to Saturday, April 30 at 11:59 PM ET**. The exam is only accessible during the final exam period. You can access it from the Assessments section of the course.

The Computer Science department requires that all final exams be administered using an online proctoring service called Examity that you will access via your course in Blackboard. Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment within the defined exam window.appointment within the defined exam window.

Final Exam Duration: **3 hours**.

The exam will be **closed book/closed notes**.

The only materials that can be used during the exam: three pieces of blank scratch paper.

The exam consists of **multiple-choice and multiple-answer questions**.

Grading Information

Grading Structure and Distribution

The grade for the course is determined by the following:

Overall Grading Percentages	
Assignments	30
Quizzes	30
Project	10
Proctored Final Exam	30

94 ≤ G	A
90 ≤ G < 94	A−
87 ≤ G < 90	B+
83 ≤ G < 87	B
80 ≤ G < 83	B−
77 ≤ G < 80	C+
73 ≤ G < 77	C
70 ≤ G < 73	C−
60 ≤ G < 70	D
G < 60	F

Graded Items:

- **Assignments**: There is one assignment due each module (check the due date at the study guide). You submit the assignment in the "Assignments" area.

- **Quizzes**: There is one quiz due each module (check the due date at the study guide). You submit the assignment in the "Assessments" area.
- **Term Project**: There is a term project that is due at the end of the Module 6 (check the due date at the study guide). You submit the term project in the "Assignments" area.
- **Proctored Final Exam:** There will be a proctored Final Exam in this course (check the final exam period at the study guide). Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment.

Ungraded Items:

- **Practice Questions:** There are practice questions built-in each module covering the module materials. They are not graded. You are encouraged to try them as often as you wish to help you practice your skills learned in the learning module.
- **Ungraded Discussion Forums:** There are ungraded discussion forums throughout the course. You are encouraged to share your knowledge and learn from your peers.
- **Live classroom sessions:** Live classroom sessions will be offered during this course in Modules 1–6. Days/times will be posted in the Study Guide and the "Announcements" area.
    - Your participation, while not mandatory, will be valuable to you and the class. To participate in the live classroom discussion, you will need to go to the "Live Classroom/Offices" area.
    - Live classroom sessions will be recorded and archived for further viewing. You go to the "Live Classroom Recordings" area to view the recordings.
    - You need to have speakers and a microphone for your computer. A headset is recommended. Or if you choose to connect via phone, enter the live classroom and click on the telephone icon. Use the phone number and passcode provided.

Expectations

It is important for each student to participate on a regular basis and complete all aspects of this course.

Due dates will be indicated in the Study Guide and in each graded item's section. If, for any reason, you are unable to meet any deadline, contact your Course Facilitator. Assignments are expected to be submitted by their respective due dates. Extensions may be granted, though **only under mitigating circumstances**. If your facilitator grants an extension, you will not be penalized. If you submit an assignment late without a permission of your facilitator, there will be a late penalty of 10% per day.