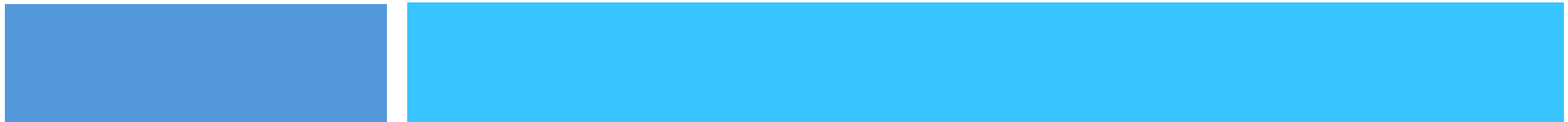# DATA STRUCTURES
CMPS 303
(FALL 2015)
PREREQUISITE: CMPS 251 **OOP**

SeBti Foufou

sfoufou@qu.edu.qa

Room: 133 (Female's Building)

Phone: 4253

Course Objectives

- Provide background in:
  - **data structures** (arrangements of data in memory) and
  - **algorithms** (methods for manipulating this data)
- Why is this important?
  - The answer is there is far more to programming than finding a solution that will work:
    - Execution time
    - Memory consumption
- So by the end of the course, you should be more equipped to not just develop an accurate solution to a problem, but the *best* solution possible.

Course Contents

Topics	No. of Weeks	Week of Delivery	Chapter
❑ Java and OOP review	1	1	Handouts + 1
❑ Arrays	1	2	2
❑ Complexity Analysis	0.5	3	Handouts + 2
❑ Simple Sorting	1	3 , 4	3
❑ Stacks	0.5	4	4
❑ Queues	0.5	5	4
❑ Linked Lists	1	5 , 6	5
❑ Recursion	0.5	6	6
❑ Midterm Exam #1	1	7	
❑ Advanced Sorting	1	8	7
❑ Binary Trees	1.5	9, 10	8, 9
❑ Hash Tables	1	10, 11	11
❑ Midterm Exam #2	1	12	
❑ Heaps (Heap sort & Priority queues)	1	12 , 13	12
❑ Graphs	1.5	13, 14	13
❑ Revision	1	15	

Course Contents (cont.)

- **Note that** there are a total of eight data structures we'll *try* to cover:
  - Arrays, stacks, queues, linked lists, trees, hash tables, heaps, and graphs
- **For each of them we will speak about:**
  - Motivation
  - Operations
    - Insertion, Searching, Deletion, etc.
 - Efficiency
  - Java Implementation

Marks Breakdown

- **100 Total marks are divided into:**
- **Theory (75 marks):**
  - Homework (10 marks):
    - Homework assignments at the end of major topics
  - Quizzes (15 marks):
    - Quizzes will be held at the end of major topics ~ 4 to 6 quizzes
  - Midterm Exam #1 (10 marks):
    - Will be held on:
      - Week of Nov. 8, 2015
  - Midterm Exam #2 (15 marks):
    - Will be held on:
      - Week of Dec. 12, 2015
  - Final Exam (25 marks):
    - Jan. 2016 (according to university's calendar)

- **Lab (25 marks):**
  - Homework (10 marks)
  - Project (15 marks):

  - N.B. Homework Submission DEADLINES should be respected, otherwise half of the mark will be deducted. Also, similar copies will receive a ZERO grade.

TextBook

Data Structures & Algorithms in Java

Second Edition
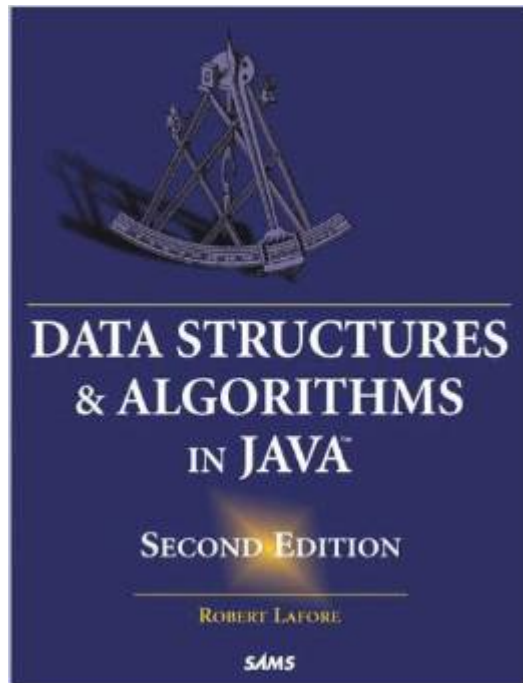
Robert Lafore

Sams Publishing

ISBN-10: 0672324539
ISBN-13: 978-0672324536

Course Learning Outcomes

- Upon the successful completion of this course, a student should be able to:

  - **Create** and **Use** fundamental **Data Structures** (Lists, arrays, Hash Tables, Stacks, Queues, Heaps, Trees, and Graphs), and **use** adequate **Java libraries**.

  - **Represent** the solution of a new problem by the right **abstract data types** and **choose** the appropriate combination of **Data Structures** to solve it.

  - **Use** elementary **analysis tools** and **Optimize time/space** in the process of data structure design.

  - **Create** efficient **recursive and iterative algorithms** in high level object oriented languages for **linear** and **non linear data structures**.

  - **Develop** and **Use** fundamental **algorithms**, as **inserting, deleting, sorting, searching, retrieving**, and **updating information** on different data representations.

Instructions for Students

- **Class Meetings:** [Lectures and Tutorials]
  - **L01:** Sunday, Tuesday and Thursday

    From 08:00 to 08:50 AM (Room E224)

- **Office Hours:** (Room E104)

  - Sunday and Thursdays:

    From 09:00 AM to 10:00 AM

  - Or by appointment (Please send emails as needed)

Important Notes

- Attendance… QU attendance policies will be enforced
  - If you miss a class you are responsible for bringing yourself up-to-date on class material and assignments.
  - Not attending a scheduled exam means you get "ZERO" unless there is a valid documented justification.
  - If your absence in lectures exceeds 25% you may be prevented from attending the final exam.
- Be punctual, pay attention and participate during class
  - Students are not allowed to be late for the lectures; you have to be on time and well prepared.
  - Chatting, and phone rings, are not allowed during the lecture.

Do your work by yourself

Email Rules

☐ When emailing the course instructor you must:

  ◻ Add – **CMPS303_L01** to the beginning of the email title

    e.g., CMPS303 – Question about …

  ◻ Please do not forget to write your name and ID number (signature) at the end of the e-mail.