King Saud University
Faculty of Computers and
Information Sciences, AlMuzahimiyah

<table>
<tr><td>Course</td><td>Data structures (COS 105)</td><td>Credit hours: 3</td></tr>
<tr><td>Instructor</td><td>Mohammed Faisal</td><td>Pre-requisites: COS 101</td></tr>
<tr><td>Office hours</td><td>Tuesday (12 pm-4 pm) and Thursday (10 am-1 pm)</td><td>Email: Mfaisal@ksu.edu.sa<br>Website: http://fac.ksu.edu.sa/mfaisal</td></tr>
<tr><td>Main purpose of COS 105</td><td colspan="2">The course aims at giving students a broad foundation in the fundamental concepts of data structures such as<ul><li>Specification, representation, and implementation of Abstract Data Types (ADTs)</li><li>Implementation of stack, lists, and queues</li><li>Design and implementation of recursive algorithms</li><li>Implementation and traversing methods of trees</li><li>Implement and traversing methods of heap, set, and graph</li></ul></td></tr>
<tr><td>Topics to be Covered</td><td colspan="2"><table>
<tr><td>Introduction to OOP elementary concepts</td></tr>
<tr><td>Data Types, Structured Data Types, Abstract Data Types.</td></tr>
<tr><td>ADT List, Specification, Representation and Linked list and Array based implementation of ADT List</td></tr>
<tr><td>Performance analysis, Introduction to complexity (Time and Space), Big O notation.</td></tr>
<tr><td>Array and Linked list implementation of Stacks, Queues, Priority Queues and their applications</td></tr>
<tr><td>Recursion, Linear and Binary recursion, Designing recursive algorithms</td></tr>
<tr><td>General Trees, Binary trees (BT), Binary Search Trees (BST), Traversal methods (Pre-, post-, and in-order)</td></tr>
<tr><td>Heap, Min-heap, Max-heap, Priority Queues using Heap implementation</td></tr>
<tr><td>Graphs and their applications, Directed, Undirected and weighted graphs, Graph representation (adjacency matrix and adjacency list), Graph Traversal algorithms (Breadth First Search and Depth First Search), Shortest path algorithms for graphs(Dijkstra’s)</td></tr>
<tr><td>Sets, Maps, Hashing Techniques, Hash table and function, collision resolution strategies.( if there is time)</td></tr>
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<tr><td>Schedule of Assessment Tasks</td><td colspan="2"><table>
<tr><td>Homework</td><td>Weeks 2, 4,6,10</td><td>5%</td></tr>
<tr><td>Quizzes</td><td>Weeks 3, 5, 7, 9, 11</td><td>10%</td></tr>
<tr><td>Tutorial</td><td>--</td><td>5%</td></tr>
<tr><td>Project</td><td>Week No. 13</td><td>10%</td></tr>
<tr><td>Midterm 1</td><td>Week No. 8</td><td>15%</td></tr>
<tr><td>Midterm 2</td><td>Week No. 12</td><td>15%</td></tr>
<tr><td>Final Exam</td><td>Week No. 16</td><td>40%</td></tr>
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<tr><td>Required Textbooks</td><td colspan="2"><ul><li>Introduction to JAVA Programming (Comprehensive Version), 10th Edition, Y. Daniel Liang, Pearson Hall, 2014.</li><li>Data Structures & Algorithms in JAVA, Goodrich &Tamassia, Wiley.</li><li>Larry Nyhoff ADTs, Data Structures, and Problem Solving with C++ (2nd Edition), Prentice-Hall.</li></ul></td></tr>
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**Email and Homework Policy:**

- Homework due dates will be during tutorial class.
- Late homework will not be accepted, you have to send homework before OR during class time.
- If you would like to send me email, please add your full name and course name to the subject line.

**Class Policy:**

- Attendance is very important, if you absent more than 25% of lectures , you will be not able to get final exam
- If you come late, you can attend the lecture, but if you come late for three times, you will be considered absent.
- If you miss one of the major exams, you will be not excused unless the instructor accepts your formal medical report
- This course requires constant studying if you have any questions do not hesitate to come and ask me at any time or email me.