Course Number & Name: 212CSS-3Data Structures

Credits and Contact Hours: 3 crs; 2 hrs for Theory+2 hrs for Lab+1 hr for Tutorial

Course Coordinator: Dr. Ahmad Taleb

Textbook Title, Author, and Year: *Data Structures and Algorithms in Java,Michael Goodrich and Roberto Tamassia, 4th Edition.*

a. Supplemental Material:

- Mark Allen Weiss: Data Structures and Algorithm Analysis in Java, 3rd Edition 2006.

- Frank M. Carrano, Data Abstraction and Problem Solving with C++, 5th Edition, Addison-Wesley , 2007.

Specific Course Information

a. Catalog Description: Study of common Abstract Data Types (ADTs), basic data structures and design and analysis of algorithms. Common ADTs: stack, queue, list, tree, priority queue, map and dictionary. Basic Data structures include arrays, linked lists, heaps, hash tables, search trees. Basic design and analysis of algorithms covers asymptotic notation, recursive algorithms, searching and sorting, tree traversal, graph algorithms.

b. Prerequisites: 111CSS-3

c. Required, Elective, or Selected Elective: Required

Specific Goals for the Course

a. Specific Outcomes of Instruction:

- Distinguish between Abstract Data Types (ADTs), data structures and algorithms.

- Calculate the costs (space/time) of data structures and their related algorithms, both source code and pseudo-code, using the asymptotic notation ($O()$).

- Describe basic ADTs (stack, queue, array list, node list, priority queue, tree, map and dictionary) and their related data structure implementations (array, single linked structure, double linked structure, heap, hash table, binary search tree, AVL tree).

- Recognize basic concepts and techniques (recursive, sorting, searching, graph) used in design of basic algorithms.

- Implement basic algorithms and ADTs using different data structures strategies in Object Oriented Programming (OOP) language.

- Decide which type of data structures and algorithms best suits the problem they are solving.

b. Student outcomes addressed by the course: a, b, c, i, j, k

Brief List of Topics to Be Covered

- Introduction to data structures and algorithms analysis

- Programming with Recursion

- Single and Node (double linked) Lists

- Stacks, Queues and Priority Queues

- Trees

- Binary Search Trees

- AVL Trees

- Heaps

- Hashing

- Graphs

- Sorting