CSCE 2211
Applied Data Structures

Course Syllabus

1. **Course number and name**
   CSCE 2211 Applied Data Structures

2. **Credits and contact hours**
   3 credit hours – offered 2 X 75 min weekly

3. **Prerequisites:** CSCE 110/1101 Fundamentals of Computing II

   Is a prerequisite for: CSCE 321/2202 Analysis and Design of Algorithms.

4. **Instructor's or course coordinator's name**
   Course Coordinator/ Instructor: Dr. Amr Goneid

5. **Text book & Resources:**

   Text book
   "Data Structures and Algorithm Analysis in C++", by Mark A. Weiss, 4th edition, Pearson, 2013, ISBN-13: 978-0132847377

   Other supplemental materials: Course Slides

   Course Web Site: http://www1.aucegypt.edu/faculty/cse/goneid/csce2211

   Language: C++

6. **Specific course information**
   a. **Course Description**
      In depth coverage of applied data structures needed by computing professionals. Includes but not limited to: Abstract data types and classes, analysis of algorithms, trees, binary search trees, dictionaries, self-balancing trees, B-Trees, red black trees, heaps, priority queues, sets, and graphs. Practical usage of the data structures is covered.
      Prerequisites: CSCE 110/1101 Fundamentals of Computing II
      Offered: in fall and spring semesters

   b. **Prerequisites or Co-requisites**
      CSCE 110/1101 Fundamentals of Computing II

c. Whether a required, elective, or selected elective course in the program:
Required

7. Learning Objectives

- Demonstrate knowledge and understanding of Data Models, Data Abstraction and ADTs and their role in problem solving and S/W development.
- Choose the appropriate data structure for modeling a given problem.
- Design and implement various ADTs in a high-level language (C++) using Object Oriented Concepts. Topics include but are not limited to: trees, binary search trees, dictionaries, self-balancing trees, B-trees, red black trees, heaps, priority queues, sets, and graphs.
- Compare alternative implementations of data structures with respect to performance.
- Demonstrate experience in the design of algorithms for solving problem that use the above data structures.
- Demonstrate knowledge of common applications for each data structure in the topic list.
- Practice basic algorithm analysis using complexity bounds (Big-Oh, Big-Theta and Big-Omega).

7. Brief list of topics to be covered

- Course Outline **(1 Lecture)**
- Data Modeling and ADTs **(1 Lecture)**
- Revision of Linear Data Structures **(1 Lecture)**
- Introduction to the Analysis of Algorithms **(4 Lectures)**
- Trees (General) **(1 Lecture)**
- Dictionaries and Binary Search Trees **(3 Lectures)**
- Self-Organizing Trees **(3 Lectures)**
- B-Trees **(2 Lectures)**
- Heaps and Priority Queues **(3 Lectures)**
- The Set Data Structure: Disjoint Sets **(1 Lecture)**
- Graphs **(5 Lectures)**

Grading Criteria:

- Assignments: 30%
- Midterms: 20%
- Term Project: 20%
- Term Paper: 10%
- Final: 20%