Department offering the program: Electronics and Electrical Communications
Department offering the course: Computer Sciences and Engineering

Course Specification

1- Course basic information :		
Course Code: CSE 116 **Department Requirement**	**Course Title: Data Structure and Algorithms**	**Academic year: 2015/2016** **Level (1) – Semester : 1st**
Field: Computer A. &ICT	**Teaching hours: Lecture [2]**	**Tutorial [0] Lab [2]**

2- Course Objectives	1. To provide students with data structures and algorithms using C++ language. 2. To introduce students to concepts of elementary static and dynamic data structures. 3. To enhance student ability to understand compound data structure. 4. To introduce students to the sorting and searching algorithms. 5. To provide students with a comparative analysis of searching and sorting algorithms and data structures.

3- Intended Learning Outcomes: ARS		**Course ILOs**
A- Knowledge and Understanding:	A.2. Outline basics of information and communication technology (ICT)	A2.1 Outline the elementary of static data structures; structure and arrays. A2.2 Outline the elementary of dynamic data structures; pointers and dynamic memory allocation/de-allocation. A2.3 Outline the compound data structure including: linked lists, stacks, queues, trees data structure and binary trees. A2.4 Outline the sorting algorithms include bubble sort, selection sort, insertion sort, merge sort, heap sort, and quick sort. A2.5 Outline the searching algorithms include sequential search, binary search and hashing. A2.6 Outline comparative analysis of searching and sorting algorithms and data structures.
	A.5. Demonstrate methodologies of solving engineering problems, data collection and interpretation	A5.1 Demonstrate methodologies of solving different data structure problems. A5.2 Demonstrate methodologies of solving data structure problems using searching algorithms.

B- Intellectual Skills	B.2 Select appropriate solutions for engineering problems based on analytical thinking.	B2.1. Select appropriate solutions for data structure problems using the proper sorting algorithms. B2.2. Select appropriate solutions for data structure problems using appropriate searching algorithms.
	B.5 Assess and evaluate the characteristics and performance of components, systems and processes.	B5.1 Assess and evaluate the characteristics and performance of Static data structure. B5.2 Assess and evaluate the characteristics and performance of Dynamic data structure. B5.3 Assess and evaluate the characteristics and performance of Compound data structure B5.4 Assess and evaluate the characteristics and performance of data structure sorting algorithms. B5.5 Assess and evaluate the characteristics and performance of data structure searching algorithms.
	B.8 Select and appraise appropriate ICT tools to a variety of engineering problems.	B8.1 Select and appraise appropriate sorting algorithms to a variety of data structure problems. B8.2 Select and appraise appropriate searching algorithms to a variety of data structure problems.
C- Professional Skills	C.1. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	C1.1 Apply knowledge of sorting algorithms to solve data structure problems. C1.2 Apply knowledge of searching algorithms to solve data structure problems.
	C.2 Professionally merges the engineering knowledge, understanding, and feedback to improve design, products and/or services.	C2.1 Professionally merges the data structure knowledge, understanding, and feedback to improve sorting algorithms. C2.2 Professionally merges the data structure knowledge, understanding, and feedback to improve searching algorithms.
D- General Skills	D.1 Collaborate effectively within multidisciplinary team.	D1.1 Collaborate effectively within multidisciplinary team during laboratory times.
	D.3 Communicate effectively.	D3.1 Communicate effectively with demonstrator and his colleagues at laboratory times.
	D.4 Demonstrate efficient IT capabilities.	D4.1 Demonstrate efficient IT capabilities in topics related to data structures and algorithms.
	D.6 Effectively manages tasks, time, and resources.	D6.1. Effectively manages tasks, time, and resources in laboratory times and exams.
	D.7 Search for information and engage in life-long self learning discipline.	D7.1 Search for information for topics relevant to data structure and algorithms..

4- Course Contents	This course covers data structures and algorithms using C++ language. It first presents the elementary of static data structures (structure and arrays) and the elementary of dynamic data structures (pointers and dynamic memory allocation/de-allocation). It then presents the compound data structure including: linked lists, stacks, queues, trees data structure and binary trees. It also introduces the sorting algorithms include bubble sort, selection sort, insertion sort, merge sort, heap sort, and quick sort as well as the searching algorithms include sequential search, binary search and hashing. Finally, the course provides a comparative analysis of searching and sorting algorithms and data structures.
5- Teaching and Learning Methods	- Lectures - Labs - Research assignments/Reports
6- Teaching and Learning Methods for disable students	• Official low cost special classes for developing student skills, arranged by the faculty administration. • Repeat the explanation based on their request in lectures and laboratory times. • Office hours for more discussion. • Training sections offered by Scientific Computing Center including computer fundamentals.
7- Student Assessment	
a- Assessment Methods	- Weekly data structure tasks at lab. times - Quizzes - Labs. - Mid-term, and final exams
b- Assessment Schedule	- Lab tasks and reports: Weekly - Quizz-1: Week no 3 - Mid-Term exam: Week no 8 - Quizz.2: Week no 11 - Lab exam: Week no 15 - Final – term examination: Week no 16
c- Weighting of Assessment	- Lab. tasks and quizzes: 10 % - Mid-term examination: 10 % - Practical and oral exam: 20 % - Final – term examination: 60 % Total 100 %
8- List of text books and references:	
a- Course notes	Lectures notes prepared in the form of a book.
b- Text books	1- Adam Drozdek, "Data Structures and Algorithms in C++", Second Edition, Brooks/Cole, A Division of Thomson Learning, 2001

c- Recommended books	1- Walter Savitch, Problem Solving with C++: The Object of Programming, 4th Edition, Addison Wesley Publishing Company, Inc., 2003. 2- Robert Lafore, Object-oriented Programming in C++, 3rd Edition, Sams Publishing Company, 1999.
d- Periodicals, Web sites …etc	http://www.cprogramming.com/algorithms-and-data-structures.html http://www.learnalgorithms.in/ https://www.coursera.org/course/algo

Course contents - ILOs Matrix

Content Topics	Week	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Elementary of static data structures, Structure and arrays	1-2	A2.1	B5.1	--	D1.1, D3.1, D4.1, D6.1
Elementary of dynamic, data structures pointers and dynamic memory allocation/de-allocation	3-4	A2.2	B5.2	--	D1.1, D3.1, D4.1, D6.1
Compound data structure including: Linked lists, stacks, queues, trees data structure and binary trees.	5-7	A2.3	B5.3	--	D1.1, D3.1, D4.1, D6.1
The sorting algorithms include bubble sort, selection sort, insertion sort, merge sort, heap sort and quick sort.	9-10	A2.4, A5.1	B2.1, B5.4, B8.1	C1.1, C2.1	D1.1, D3.1, D4.1, D6.1, D7.1
The searching algorithms include sequential search, binary search and hashing.	11-12	A2.5, A5.2	B2.2, B5.5, B8.2	C1.2, C2.2	D1.1, D3.1, D4.1, D6.1, D7.1
Comparative analysis of searching and sorting algorithms and data structures.	13-14	A2.6, A5.1, A5.2	B2.1, B2.2, B5.4, B5.5, B8.1, B8.2	C1.1, C2.1, C1.2, C2.2	D1.1, D3.1, D4.1, D6.1, D7.1

Teaching and Learning Methods - ILOs Matrix

Teaching and Learning Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Lectures	A.2, A.5	B.2, B.5, B.8	C.1, C.2	D.3
Labs	A.2, A.5	B.2, B.5, B.8	C.1, C.2	D1,D3,D4,D6,D7
Research assign/Reports	A.2, A.5	B.2, B.5, B.8	C.1, C.2	D4, D6,D7

Assessment Methods - ILOs Matrix

Assessment Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Weekly data structure tasks at lab. times	A.2, A.5	B.2, B.5, B.8	C.1, C.2	D.1, D.3, D.4, D.6, D.7
Labs	A.2, A.5	B.2, B.5, B.8	C.1, C.2	D.1, D.3, D.4, D.6, D.7
Quizzes	A.2, A.5	B.2, B.5, B.8	C.1, C.2	D.4, D.6
Midterm, and Final Written exams	A.2, A.5	B.2, B.5, B.8	C.1, C.2	D.4, D.6

Authorized from department board at 15/05/2016
Authorized from college board at 05/06/2016

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