Detailed Course Description - Course Plan Development and Updating Procedures/ Department of Software Engineering	QF01/0408-3.0E

Faculty	Faculty Of Science & IT	Department	Software Engineering
Course number	0114212	Course title	Data Structure
Number of credit hours	3	Pre-requisite/co-requisite	0114221

This course defines different concepts such as “Data structure”, “Abstraction”, “Abstract Data Type” and the concepts of program efficiency. It explains the different ADT: List, Stack, Queue and Tree and gives the different data structure to represent and implement each ADT. Beside it shows the relation between these ADT and the real life applications.

	Course goals and learning outcomes
Goal 1	Explain the concept of “Data Structure”, “Abstraction”
Learning outcomes	1.1 Understanding the difference between Data Structure and Abstraction 1.2 Understand the difference between Data structure and programming language.
Goal 2	Explain “Abstract Data Type” concept, the different ADT types and there implementation
Learning outcomes	2.1 Understanding the concept of an Abstract Data Type (ADT). 2.2 Describe the properties, interfaces, and behaviors of basic abstract data types, such as List, Sorted List, Stack, Queue and Tree
Goal 3	Enabling students to design and implement some user defined data structures for the different ADT as Java classes.
Learning outcomes	3.1 Compare and contrast the operation of common data structures (such as linear structures, priority queues, tree structures, in terms of abstract data types operations and their implementation 3.2 Have a good knowledge in which data structure should be used with each ADT
Goal 4	Giving practice in application of new user-defined data structures.

Learning outcomes	4.1 Solve problems computationally through the application of fundamental data structures 4.2 Improving the programming skills of students in use of some object-oriented programming language (Java).
Textbook	- Data Structures: Abstraction and Design Using Java 3rd Edition, Dec 9, 2015 by Elliot B. Koffman (Author), Paul A. T. Wolfgang (Author), ISBN-10: 1119355214
Supplementary references	1- Data Structures and Algorithms in Java 6th Edition; Jan 28, 2014 by Michael T. Goodrich (Author), Roberto Tamassia (Author), Michael H. Goldwasser **(Author).** ISBN-10: 1118771338 2.- Cracking the Coding Interview: 189 Programming Questions and Solutions 6th Edition, Jul 1, 2015 by Gayle Laakmann McDowell, **ISBN-10: 0984782869** 3.- Data Structures and Abstractions with Java (4th Edition) 4th Edition, Aug 31, 2014 by Frank M. Carrano (Author), Timothy M. Henry (Author), ISBN-10: 0133744051 4- Problem Solving in Data Structures & Algorithms Using Java: The Ultimate Guide to ProgrammingFirst Edition Edition, Oct 21, 2016 by Hemant Jain, ISBN-10: 1539724123

Course timeline				
Week	**Number of hours**	**Course topics**	**Pages (textbook)**	**Notes**
01	**1** **1** **1**	Review of some Java concepts		
02	**1** **1** **1**	List and the Collection Framework Algorithm Efficiency and Big-O	**53 - 60**	
03	**1**	The List Interface and ArrayList Class	**63- 75**	

	1 1	Application of ArrayList Implementation of ADT List using Array		
04	1 1 1	Implementation of ADT List Using Array	70 - 75	
05	1 1 1	Single-Linked lists	75 – 83	
06	1 1 1	Double-Lined Lists and Circular lists Stack Abstract Data Type Implementing a Stack with an ArrayList	84,85,87 148 – 150 155	
07	1 1 1	Implementing Stack as a Linked Data Structure Review of previous Topics First Exam	157	
08	1 1 1	Additional Stack Application - Converting From Infix to Postfix - Evaluation Postfix Expressions	165	
09	1 1 1	Additional Stack Application - Evaluation Postfix Expressions Recursion	160 211 - 225	
10	1 1 1	Recursion Recursion Queue Abstract Data Type	211 – 225 177 - 180	
11	1 1 1	Queue Abstract Data Type Queue Applications Implementing the Queue Interface	177 – 180 181 187	
12	1 1 1	Implementing the Queue interface - Using a Single-Linked List - Using a Circular Array to Implementing the Queue Interface	 187 189	
13	1 1 1	Review previous topics Second Exam Trees - Tree Terminology and Applications	257- 264	
14	1 1 1	Tree Terminology and Applications Tree Traversals Tree Traversals	257- 264 265 - 267	
15	1 1 1	Binary Search Tree	282 -294	
16	1 1	Final Exam		

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Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	**Practical (clinical) course evaluation methods**	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%

Approved by head of department		**Date of approval**	

Extra information (to be updated every semester by corresponding faculty member)

Name of teacher	M. Rana Bader	Office Number	
Phone number (extension)		Email	drranab@zug.edu.jo
Office hours			