Department of Computer

College of Science

University of Salahaddin

Subject: Data Structures

Course Book – Second stage / course I)

Lecturer's name: MSc. Nasreen Thabit Na'mma

Academic Year: 2020/2021

Course Book

1. Course name	Data Structures in C++
2. Lecturer in charge	MSc. NasreenThabitNa'mma
3. Department/ College	Computer/Science
4. Contact	*nisreen.alshaaban@su.edu.krd*
5. Time (in hours) per week	Theory: 2 Practical: 2
6. Office hours	2
7. Course code	
8. Teacher's academic profile	https://sites.google.com/a/su.edu.krd/nasreen-thabit/

9. Keywords	Data structure

10. Course overview:

      Data structures provide a means to manage large amounts of data for use in databases and internet indexing services. Efficient data structures are key for designing efficient algorithms and obtaining maintainable software design.

      In this Computer Science course, you will start by learning basic data types, such as numbers, and gradually build a conceptual framework for organizing and managing efficient structures.

      The course consists of two parts (theoretical and practical).And this will focus on algorithms, analysis, and the use of basic and advanced data structures. Among the specific data structures are covered arrays, stacks, queues and records. Recursion will also be covered.

11. Course objective:

- **Provide an overview of programming languages and problem solving techniques.**
- **Develop programming skills with the understanding of the fundamentals and basics of C++ Languages.**
- **Impart knowledge about linear data structures including arrays, stacks, records & queues.**

- **Write programs with the help of basic elements including control statements, arrays and strings.**
- **Understand the uses of both one dimensional and multi-dimensional arrays.**
- **Describe how arrays, records are represented in memory and used by algorithms**
- **Describe common applications for arrays, stacks and queues.**
- **Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack**

12. Student's obligation

Attendance is required. Pop quizzes may be given on assigned reading and on material covered in classes. Cell phones must be silent during class. Questions are encouraged - raise your hand to be recognized. Try to formulate the question before asking it, and wait to see if it is answered in a few minutes so we can maintain flow. Lengthy discussions will be deferred to office hours.

13. Forms of teaching

- **The lecture method by writing and speaking**
- **Using DataShow**
- **Demonstrating through examples**
- **Cooperative Group Assignments**
- **Making quiz for feedback**

14. Assessment scheme
The grade will be based upon the following criteria:

One closed book exams (theoretical) ------------------- 15 %

One closed book exams (practical) ---------------------- 35 %

Final exam   --- 50 %

15. Student learning outcome:

- **Be able to use and implement fundamental data structures including stacks, queues, lists, trees and graphs.**

- **Learn to use recursion to solve problems.**
- **Implement/ utilize various data structures using a programming language such as C++.**
- **Learn various searching and sorting techniques.**
- **Learn about dynamic memory allocation**
- **Be stronger programmer**

- **To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.**
- **To get a good understanding of applications of Data Structures.**
- **To develop a base for advanced computer science study.**
- **To define basic static and dynamic data structures and relevant standard algorithms for them: stack, queue, dynamically linked lists, trees, graphs, sorting algorithms, min-max algorithm.**
- **To demonstrate advantages and disadvantages of specific algorithms and data structures**

16. Course Reading List and References:

▪Baluja, G., S., 2008, *Data Structures Through C++,* DHANPAT RAI & CO.(P) LTD, Delhi

▪ Reema Thareja, 2014, *Data Structures using C,* Published in India by Oxford University Press

17. The Topics:

Week(s)	Basic Tutorial Subject to be covered	Lab
1	**Introduction:** What is Data Structures and Algorithms Analysis.	• **Reviewing of array**
2-3	**Arrays:** Memory Representation and address computation of 1D and 2D arrays.	• **Operations on arrays (Adding)**
4-5	**Structures(records)**	• **Operations on arrays (Deleting)**
6-7	**Stack:** Introduction, Operations, and Applications.	• **structures**
8-9	**Infix and Postfix Expressions:** Algorithm of Converting infix expression into postfix form, Algorithm of Evaluation of postfix form with examples	• **Operations on stack(Push, Pop) Using array**
10	**Recursion and backtracking.**	**Recursive functions**
12-13	**First Midterm Exam**	
14-15	**Queues:** Introduction, Linear Queue (Operations and Applications), Circular Queue (Operations and Applications).	**Operations on queue using array**
	Final exam (course I)	

19. Examinations: *Compositional:*

1. **What are the main measures for the efficiency of algorithms?**

    Ans: Time and space

Multiple choices:

1. **------------ is the data structures used to perform recursion.**

a-queue   b-binary tree   c- stack

ans: c