CS634 Data Structure and Algorithms

Course Name	Data Structure and Algorithms
Course Code	CS634
Course Type	Professional
Credits/Hours	4
Pre-Requisites	Programming 1
Instructor	Lutf Ul Rahman Haqmal

Course Description

This course introduces fundamental concepts in data structures and reviews important concepts in object oriented programming; it also attempts to develop good programming skills and habits, including for example, good software testing skills. To accomplish these two goals, the course has a heavy programming component, to be completed using Java.

Course Outcomes

Students who complete the course will have demonstrated the ability to do the following:

- Work with procedural and object-oriented aspects of the Java language.
- Describe and implement common data structures––lists, stacks, queues, graphs, and trees––for solving complex programming problems.
- Develop sound techniques on designing, developing, and documenting well-structured programs using proper software engineering principles.
- Use mathematical techniques to analyze the efficiency of the various algorithms presented, as well as the common operations on the data structures discussed.
- Compare between different data structures. Pick an appropriate data structure for a design situation.

Textbooks and Material

Recommended

- Data Structures and Algorithms in Java, 2nd Edition. By Robert Lafore
- M. Weiss. Data Structures and Problem Solving using Java. 4th Edition. Addison-Wesley, 2006.

Supplementary Texts

- A good Java reference, such as the following, will also be useful. Arnold, Gosling, and Holmes, The Java Programming Language. 3rd Edition. Addison-Wesley, 2000. A book such as the following will help you learn Java on your own: Deitel and Deitel, Advanced Java 2 Platform: How to Program. Prentice-Hall.

Course Policies

Course policies include terms that students should know prior to attending this course as well as during the semester while the course is in progress. Course policies are explained below.

Attendance Policy

Class attendance for this course is mandatory. Students should be present during class hours and they have to work on their projects to be prepared for the class. Based on the MOHE regulations students should attend at least 75% of class hours to be allowed to enter the final exam.

Grading Policy

This course has practical activities which need to be worked and presented by students. We use below grading percentages for this course:

Midterm Exam	20%
In-Class/Out-of-Class Activities	10% to 25%
Final Exam	55% to 70%

Note: Based on the rule and regulation of the Ministry of Higher Education, any kind of cheating and plagiarism is unacceptable and will result an F (fail) for the course grade.

Cell Phone and Laptop Usage

All cell phone calls during the lecture must be cancelled except very urgent calls. During the exams cell phones must be turned off and be placed in pockets or boxes. Laptop computers and other electronic devices would only be allowed when I indicate; otherwise, they must be turned off.

Assignment policy

Assignments are to be submitted on-time. Late assignment are accepted but with a penalty of 10 percent per day late. Assignment submitted after the solutions will not be accepted. You are free to ask for information about assigned activities the work must be completed by yourself. For on assignments/projects group work and student collaboration is required. To complete each assignment a minimum of 2 and a maximum 3 student groups can be set.

Academic Honesty and Integrity

University is the place for learning, education and knowledge. Without honesty and integrity there is no meaning for education and knowledge. The academic environment of university required from all of us to follow all the academic and ethical principles. This is the obligation of all of us to be honest in all dealings with fellow student, staff, and instructors. Behavior inconsistent with these obligations will not be tolerated. Cheating, plagiarism or any kind of disruptive behavior are all examples of behavior that fall below the norms of academic integrity. A student who engages in any such behavior will be immediately introduce to the faculty committee of discipline. All penalties will be according to the rule and regulation of the Ministry of Higher Education. We all need to create an environment conducive to learning, which means respect each other, being on time, turning off cell phones, listening, and contributing to your lessons. If you need special learning accommodations, it is important that I know about it as soon as possible.

Course Plan

Weekly Coverage

- Week-1
  - Overview of Data Structures and OOP, Arrays
- Week-2
  - Simple Sorting
- Week-3
  - Stacks and Queues, Priority Queues
- Week-4
  - Linked Lists and its Operations
- Week-5
  - Recursion
- Week-6
  - Merge Sort and Quick Sort
- Week-7
  - Binary Trees
- Week-8
  - Tree Traversals
- Midterm Exam (Week 9)
- Week-10
  - Hash Tables
- Week-11
  - Heaps
- Week-12
  - Graphs
- Week-13

    - DFS and BFS in Graphs, Minimum Spanning Trees
- Week-14
    - Final review

Assessment Method

Assessment	Percentage
Mid-Term Exam	20
Project & Class Activities	10 to 20
Final Exam	60 to 70