Al-Al Bayt University
Prince Hussein bin Abdullah Faculty of Information Technology
Computer Science

Course Title : Data Structure and File Processing
Course Number :901230
Credit Hours :3
Pre requisite :
Placement :
Instructor:
Course Description :
General objectives :
By the completion of this course, the student should be able to design the data structure and choose the proper algorithm in order to implement a given task in an effective manner. Furthermore, the student should be able to use the C++ language to implement the algorithms presented in this course using the standard data structures. File processing is covered to let the student be able to deal with the most common operations related to file input and output.
Course outline :
Fundamental data structures

- Class and array review.
- Stacks by arrays.
- Queues by arrays.
- Pointers review.
- Linked lists.
- Stacks by Linked List.
- Queues by Linked List.
- Doubly Linked List.
- Heaps.
- Trees.

Data structures search and sort algorithms

- Sorting:

  Selection, Insertion, Bubble, Quick and Heap sorting algorithm

  Select a suitable sorting algorithm and algorithms time and space complexities.

- Searching:

  Linear, Linear with high probability, Binary search algorithms

Hashing

File Processing

* Write to a file.
* Read from a file.
* Text file and Binary file.
* Using write statment.
* Using read statment.

Evaluation methodology :

First Exam.....20
LAB assignments.....10
Second Exam.....20
Final Exam.....50

References :

*Data Structures and Program Design in C++1999, International Edition, Prenice Hall,
*C++ How to ProgramThird Edition or Fourth Edition, Prentice Hall,

Course Schedule :

Topic_____Hours

Introduction and Review----------9
Introduction to Stacks
? Section 2.1.1Lists and Arrays
? Section 2.1.2 Stacks
? Section 2.1.3 First Example: Reversing a list
? Section 2.1.5 The Standard Template Library
? 2.2 Implementation of Stacks
? Section 2.2.1 Specification of Methods for Stacks.
? Section 2.2.2 The Class Specification
? Section 2.2.3 Pushing, Popping, and other Methods
----------9
Queues
? Section 3.1 Definitions
? Section 3.1.1 Queue Operations
? Section 3.2 Implementations of Queues
? Section 3.3 Circular Implementation of Queues in C
----------9
Linked Stacks and Queues
? Section 4.1 Pointers and Linked Structures
? Section 4.1.1 Introduction and Survey
? Section 4.1.2 Pointers and Dynamic Memory in C
? Section 4.1.3 The Basics of Linked Structures
? Section 4.2 Linked Stacks
----------9
? Section 4.3 Linked Stacks with Safeguards
? Section 4.3.1 The Destructor
? Section 4.3.2 Overloading the Assignment operator
? Section 4.3.3 The Copy Constructor
? Section 4.3.4 The Modified Linked ? Stack Specification.
----------9
First Exam

? Section 4.4 Linked Queues
? Section 4.4.1 Basic Declarations
? Section 4.4.2 Extended Linked Queues----------9
Review the exam with students
Recursion
? Section 5.1 Introduction to Recursion
? Section 5.1.1 Stack Frames for Subprograms
? Section 5.1.2 Tree of Subprogram Calls
? Section 5.1.3 Factorials: A Recursive Definition
? Section 5.1.4 Divide and Conquer: The Towers of Hanoi
? Section 5.2 Principles of Recursion
? Section 5.2.1 Designing Recursive Algorithms
? Section 5.2.2 How Recursion Works
? Section 5.2.3 Tail Recursion
? Section 5.2.4 When not to use Recursion
? Section 5.4 Tree Structured Programs----------18
Lists and Strings
? Section 6.1 List Definition
? Section 6.1.1 Method Specification
? Section 6.2 Implementation of Lists
? Section 6.2.1 Class Templates
? Section 6.2.2 Contiguous Implementation
? Section 6.2.3 Simply Linked Implementation
? Section 6.2.4 Variation: Keeping the Current Position
? Section 6.2.5 Doubly Linked Lists
? Section 6.2.6 Comparison of Implementations
----------18
Review the exam with students
Second Exam
Searching
? Section 7.1 searching (Introduction)
? Section 7.2 Sequential Search
? Section 7.3 Binary Search
? Section 7.3.1 Ordered Lists
? Section 7.3.2 Algorithm Development
? Section 7.3.3 The Forgetful Version
? Section 7.3.4 Recognizing Equality
? Hashing----------18
Binary Trees
Section 10.1 Binary Trees
Section 10.1.1 Definitions
Section 10.1.2 Traversal of Binary Trees
Section 10.1.3 Linked Implementation of Binary Trees
Section 10.2 Binary Search Trees
Section 10.2.1 Ordered Lists and Implementations
Section 10.2.2 Tree Search
Section 10.2.3 Insertion into a Binary Search Tree
Section 10.2.4 Tree Sort

Section 10.2.5 Removal from a Binary Search Tree
----------9
Section 10.3 Building a Binary Search Tree
Section 10.3.1 Getting Started
Section 10.3.2 Declarations and the main Function
Section 10.3.3 Inserting a Node
Section 10.3.4 Finishing the Task
Section 10.3.5 Evaluation
Section 10.3.6 Random Search Trees and Optimality
----------18
Final exam
Revision
----------9