

Computer Science 2305 – Data Structures

Student Learning Outcomes

1. Students will have a better understanding of the C++ class concept.
2. Students will know how to use the C++ Standard Template Library (STL), including the vector, deque, and list containers and the stack, queue, and priority queue container adaptors.
3. Students will learn techniques of algorithm analysis.
4. Students will learn about recursion.

Course Content

Textbook: *Data Structures with C++ Using STL*, Second Edition, by William Ford / William Topp
The following chapters including the particular sections listed are covered. (See textbook “Contents”)

- 1. Introduction to Data Structures**
 - Abstract View of Data Structures
 - An ADT as a Class
 - Implementing C++ Classes
 - Declaring and Using Objects
 - Implementing a Class with Inline Code
- 2. Object Design Techniques**
 - Object Composition
 - Operator Overloading
- 3. Introduction to Algorithms**
 - Selection Sort
 - Simple Search Algorithms
 - Analysis of Algorithms
 - Making Algorithms Generic
 - The Concept of Recursion
- 4. The Vector Container**
 - Overview of STL Container Classes
 - Template Classes
 - The vector Class
- 5. Pointers and Dynamic Memory**
 - C++ Pointers
 - Dynamic Memory
 - Classes Using Dynamic Memory
 - Assignment and Initialization
 - The miniVector Class
 - The matrix Class
- 6. The List Container and Iterators**
 - The list Container
 - Iterators

- General List Insert and Erase Operators
- 7. Stacks**
- The stack ADT
 - Stack Implementation
 - Postfix Expressions
- 8. Queues and Priority Queues**
- The queue ADT
 - The Radix Sort
 - Implementing the miniQueue Class
 - Priority Queues
- 9. Linked Lists**
- Linked List Nodes
 - Building Linked Lists
 - Handling the Back of the List
 - Doubly Linked Lists
 - Updating a Doubly Linked List
 - The miniList Class

Additional Content

Any section or chapter not listed previously.