

J. Sargeant Reynolds Community College  
Course Content Summary

Course Prefix and Number: CSC 223 Credits: 4

Course Title: Data Structures and Analysis of Algorithms

Course Description :

## Scientific Literacy

- x Represent real-world objects and processes virtually by identifying properties, behavior, and operations relevant to solving problems on a computer.

## Written Communication

- x Develop, convey, and exchange ideas in writing, as appropriate to a given context and audience

## Review of Object - Oriented Principles

- x Compare and contrast procedural versus object-oriented programming
- x Design class hierarchies using inheritance and interfaces
- x Implement in code OOP constructs including encapsulation, inheritance, and polymorphism
- x Review the design, implementation, and efficiency of recursive algorithms
- x Review of arrays and exception handling

## Analysis of Algorithms

- x Discuss the differences between iterative vs. recursive algorithms
- x Demonstrate worst-case complexity function
- x Define other complexity functions such as best case, average case, and amortized.

## Data Structures

- x Describe and explain abstract data types including stacks, queues, singly and doubly linked list, sets, maps and graphs
- x Compare and contrast contiguous and linked structures
- x Explain the purpose and use of iterators
- x Implement in code the various data structures using both contiguous and linked applications where applicable
- x Analyze the time and space efficiency of data structures and algorithms and apply this analysis to select the best tools for solving problems.
- x Explain how generics and parameterized types implement dynamic binding with polymorphism.

## Searching and Sorting Algorithms

- x Analyze a variety of algorithms for searching and sorting
- x Classify algorithms based on time and space complexity

