

**RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE**

CSIT 254 - Data Structures

I. Basic Course Information

- A. Course number and Title: **CSIT 254- Data Structures**
- B. New or Modified Course: **Modified**
- C. Date of Proposal: Semester **Fall** Year: **2024**
- D. Effective Term **Fall 2025**
- E. Sponsoring Department **Mathematics and Computer Science**
- F. Semester Credit Hours: **4**
- G. Weekly Contact Hours: **5** Lecture: **__3__**
Lab: **__2__**
Out of class student work per week: **__7__**
- H. ☒ Prerequisite (s): **A grade of C or better in CSIT 105 - Foundations of Computer Science or a grade of C or better in GDEV 242 – Object Oriented Programming**
- ☐ Corequisite (s):
- I. Additional Fees: **None**

II. Catalog Description

Prerequisite: A grade of C or better in CSIT 105 - Foundations of Computer Science or a grade of C or better in GDEV 242 – Object Oriented Programming. This course introduces students to the fundamental data structures used in Computer Science. The data structures covered include linked lists, doubly linked lists, stacks, queues, trees, and graphs. Algorithms that manipulate these data structures are discussed and used in laboratory work. Students are introduced to the run-time analysis of algorithms and basic algorithms for searching and sorting.

III. Statement of Course Need

- A. This course introduces some of the most fundamental concepts in Computer Science - how data is represented and manipulated in software.

This course addresses a need for currently employed software developers who wish to upgrade their skills.

The organization of Data Structures follows the recommendations made by the Association for Computing Machinery.

- B. This course has a weekly lab component. The lab is essential for providing students hands on programming to write Java programs to implement and use Data Structures
- C. This course generally transfers as a Computer Science Requirement dependent on the transfer institution.

IV. Place of Course in College Curriculum

- A. Free Elective
- B. This course serves a Programming Elective on the Computer and Programming Electives List
- C. This course meets a Requirement in
 - 1. Computer Science A.S. Degree
 - 2. Information Systems & Technology A.S. Degree
 - 3. Game Development A.A.S Degree
- D. This course is an option in:
 - 1. Engineering A.S. Degree, Electrical/Computer Track
- E. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content

This course explores the following topics:

1. The Software Development Life Cycle
2. Run-Time Analysis (Big-O() Analysis)
3. Data Abstraction
4. Linked Lists and Doubly Linked Lists
5. Stacks
6. Queues
7. Recursion / Recursion on Data Structures
8. Trees / Binary Search Trees
9. Searching (Hash Tables)

10. Sorting (Recursive Merge Sort)

VI. A. Course Learning Outcomes

After completion of this course, students will be able to:

1. design and develop data structures that efficiently address program requirements (GE 4)
2. analyze the data structures used in computer applications and the issues surrounding their implementation (GE 4)
3. apply quantitative reasoning to analyze the performance of data structure algorithms in order to efficiently solve problems (GE 2,4)
4. compare and contrast the basic data structures used in Computer Science: lists, stacks, queues, trees and graphs
5. identify and implement the basic operations for manipulating each type of data structure
6. create data structures using Java
7. analyze the run-time analysis of algorithms and express them using Big-O () notation
8. apply recursion to data structure operations
9. identify the appropriate data structure for a given problem
10. analyze algorithms to search or sort the data in various data structures (arrays, queues, stacks, etc.) and interpret their run-time performance
11. create and execute test plans which include the testing of boundary conditions

B. Assessment Instruments

- A. Homework Assignments
- B. Programming Labs
- C. Programming Projects
- D. Exams

VII. Grade Determinants

- A. Homework Assignments
- B. Programming Labs
- C. Programming Projects
- D. Midterm Exam
- E. Final Exam

Primary formats, modes, and methods for teaching and learning that may be used in the course:

- A. Lecture/Discussion -- New concepts are introduced in interactive lectures.
- B. Laboratory -- Students apply new concepts in the laboratory. This also allows for one-on-one instruction and assistance.

VIII. Text and Materials

Suggested Textbook—Main, Michael. Data Structures & Other Objects Using JAVA, 4th Edition, Pearson, 2012.

(Please note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

IX. Resources

- A. Computer Lab for classroom instruction and exercises utilizing Java SDK Version 21 or higher and an IDE such as Notepad++, TextPad, SciTe, NetBeans, or Eclipse)
- B. Access to Internet for Java Documentation at www.oracle.com

X. Check One: ☐ Honors Course ☐ Honors Options ☒ N/A