

1. Course number and name

CptS 132: Data Structures Java

2. Credits and contact hours

4 credits, 3 lecture hours, 3 lab hours

3. Instructor's or course coordinator's name

Kyle Doty

4. Textbook, title, author, and year

E.B. Koffman and P.A.T. Wolfgang. 2015. *Data Structures: Abstraction and Design Using Java* (3rd ed.). John Wiley & Sons. Print ISBN: 978-1119355212

5. Specific course information

- a. *Catalog description:* Advanced programming techniques: data structures, recursion, sorting and searching, and basics of algorithm analysis. Taught in Java programming language.
- b. *Prerequisites or corequisites:* CPT S 131 with a C or better.

6. Specific goals for the course

By the end of the course, students will be able to

- Design, apply, and implement data structures including lists, stacks, queues, and binary trees (1a, 1b, 1d, 1e, 6a, 6b, 7b, 7c, 7d, 7f, 7g).
- Apply and implement several sorting algorithms (1a, 1b, 1d, 1e, 6a, 6b, 7b, 7c, 7d, 7f, 7g).
- Analyze algorithmic complexity (6c).
- Design, implement, and test Java programs applying modern tools and techniques (1a, 1b, 1d, 1e, 6a, 6b, 7b, 7c, 7d, 7f, 7g).
- Analyze a specification of a problem of moderate complexity, and construct a structured, elegant Java program that solves the problem with the most appropriate data structure(s) (1a, 1b, 1d, 1e, 6a, 6b, 7b, 7c, 7d, 7f, 7g).
- Design and articulate solutions to lab problems (1a, 1b, 1d, 1e, 3a, 3b).
- Identify and implement test cases to edge scenarios in pseudocode and/or Java code (6b, 6d).
- Identify, analyze, and solve Java code and data structures interview questions in prep for internships (1a, 1b, 1c, 1d, 1e).

7. Brief list of topics to be covered

- Data Structures
- Linked Lists
- Stacks
- Queues
- Binary Search Trees
- Recursion

- Software Design and Engineering Concepts
- Problem Solving Strategies
- Classes and Objects
- Inner Classes
- Generic Classes
- Operator Overloading
- Function Overloading
- Algorithmic Analysis (Big-O)
- Abstract Data types
- Inheritance
- Sorting Algorithms
- Polymorphism
- Intro to Graphics
- Exception Handling
- Java Class Libraries
- Packages
- Jar files
- JUnit
- Heaps
- Hashing