MASTER COURSE OUTLINE
Prepared By: Arthur Wanner/Tom Willingham Date: February 2021

COURSE TITLE
Data Structures and Algorithms with Java

GENERAL COURSE INFORMATION

Dept.: CS	Course Num: 245	(Formerly:)
CIP Code: 11.0901	Intent Code: 21	Program Code: 527
Credits: 5		
Total Contact Hrs Per Qtr.: 88		
Lecture Hrs: 22	Lab Hrs: 66	Other Hrs:

Distribution Designation: General Elective (GE)

COURSE DESCRIPTION (as it will appear in the catalog)
The 3rd course in a yearlong study of the foundations of Computer Science. In this course a variety of data structures and their associated algorithms are implemented and utilized. Basic data structures such as arrays, linked lists, stacks, queues, sets, and trees are studied and applied to problems in data storage and manipulation. Basic sorting algorithms are studied. Design, analysis, and implementation techniques are discussed to illustrate and apply the concepts of the course.

PREREQUISITES
CS 142 or Instructor Permission

TEXTBOOK GUIDELINES
Textbook and materials to be determined by CS Faculty

COURSE LEARNING OUTCOMES
Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:

1. Apply data abstraction techniques to implement a variety of fundamental data structures.
2. Utilize unit testing features to test methods and reduce bugs and regression errors.
3. Analyze the time and space performance of algorithms using big O notation.
4. Construct and use sequential data structures, including lists, stacks, queues, deques, and sets.
5. Differentiate between array based and linked list-based implementations of sequential data structures.
6. Utilize generic programming when building data structures.
7. Utilize common interfaces such as Collection, List, Iterator, and Comparable.
8. Use common data structures from the Java Collections library.
9. Implement algorithms to define (construct, insert, delete, search, and traverse) binary search trees.
10. Analyze a scenario, select/design the appropriate data structure(s) to apply, and implement an efficient solution to solve the problem.

INSTITUTIONAL OUTCOMES

IO1 **Communication**: Students will be able to communicate clearly and effectively within a workplace context

IO2 **Quantitative Reasoning**: Analyze and solve computational problems using a modern program language

IO3 **Human Relations/Workplace Skills**: Students will be able to demonstrate teamwork, ethics, appropriate safety awareness and/or workplace specific skills

COURSE CONTENT OUTLINE

1. Unit Testing
2. Algorithm Analysis & Big O Notation
3. Generic Programming
4. Interfaces
5. Arrays & Linked Lists
6. Stacks, Queues & Sets

DEPARTMENTAL GUIDELINES *(optional)*

Ryan Durall _____ February 2, 2021

DIVISION CHAIR APPROVAL **DATE**