

# Inver Hills Community College

## CS 2300: Algorithms and Data Structures

### A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 4

Lab Hours/Week: 0

OJT Hours/Week: \*.\*

Prerequisites:

This course requires both of these prerequisite categories

1. One of these two

CS 1110 - Computer Science I with Java

CS 1119 - Computer Programming with C++

And

2. MATH 1118 - College Algebra I (Minimum grade: 2.0 GPA Equivalent and Number of Years Valid: 2)

Corequisites: None

MnTC Goals: None

Introduces procedural and data abstraction. Includes elementary abstract data types including lists, stacks, queues, and their applications. Includes intermediate abstract data types including trees, priority queues, heaps, hash tables, and their applications. Topics also include recursion and graph theory.

**B. COURSE EFFECTIVE DATES:** 04/02/2018 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Introduction to object-oriented programming (7%)
2. Abstract Data Types (6%)
3. Static & dynamic implementations of: linked lists, stacks, and queues (22%)
4. Generic Objects (7%)
5. Recursion (7%)
6. Algorithm analysis (7%)
7. Sorting: quicksort, merge sort, heap sort, shell sort, and radix sort (10%)
8. Hashing and collision strategies (7%)
9. Trees, traversals, and heaps (20%)
10. Graph theory (7%)

#### **D. LEARNING OUTCOMES (General)**

1. Implement recursive and iterative algorithms over appropriate data structures (e.g., tree traversal, pre-order, and post-order)
2. Analyze recursive and iterative algorithms for space-time complexity
3. Identify appropriate use of and implement statically allocated data structures.
4. Identify appropriate use of and implement dynamically allocated data structures.
5. Develop and implement a dictionary data type incorporating hashing algorithms and collision avoidance.
6. Write programs that use each of the following data structures: arrays, records/structs, strings, linked lists, stacks, and queues
7. Implement algorithms and underlying data structures utilizing standard object oriented design principles.

#### **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

None

#### **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

#### **G. SPECIAL INFORMATION**

None noted