COURSE DESCRIPTION

Dept., Number	**CS 2401 Required**	Course Title	Elementary Data Structures and Algorithms
Semester hours	45 hours + 21 lab hours	Course Coordinator	Christopher Kiekintveld

Current Catalog Description

Programming and Algorithms (3-3) Second course for students majoring in Computer Science. Fundamental computing algorithms including searching and sorting; elementary abstract data types including linked lists, stacks, queues and trees; introduction to algorithm analysis.

Textbook:

Liang, Y. Daniel. *Introduction to Java Programming*, 9th edition, COMPREHENSIVE VERSION

Course Outcomes:

Level 3: Synthesis and Evaluation:

Level 3 outcomes are those in which the student can apply the material in new situations. This is the highest level of mastery. On successful completion of this course, students will be able to identify, implement and use the following data structures as appropriate for a given problem:

1. Design and implement solutions to computational problems using the following data structures:
    a. multi-dimensional arrays;
    b. lists implemented as arrays or linked lists;
    c. stacks;
    d. queues;
    e. binary trees and binary search trees.

Level 2: Application and Analysis:

Level 2 outcomes are those in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details. Upon successful completion of this course, students will be able to:

1. Describe, implement, and use the following concepts:
    a. classes, subclasses, and inheritance
    b. encapsulation and information hiding
2. Describe, implement, and use the following algorithms:
    a. sequential and binary search
    b. quadratic and O(n log n) sorting
    c. string manipulation and parsing
3. Describe and trace computer representation and memory allocation of:
    a. integers, real numbers, arrays and objects

b. methods, including recursive methods and the use of activation records

4. Use basic notions of algorithm complexity:

a. use Big-O notation to express the best-, average- and worst-case behaviors of an algorithm

b. determine the best, average and worst-case behaviors of a simple algorithm

c. assess time and space trade-offs in algorithms

5.Use recursion and iteration as problem solving techniques

Level 1: Knowledge and Comprehension

Level 1 outcomes are those in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. On successful completion of this course, students will be able to:

1. Explain the concept of polymorphism

Student Outcomes

Student Outcomes: 1, 3, 9

Prerequisites by Topic:

CS 1401 with a grade of "C" or better.