

## COURSE OUTLINE OF RECORD

<b>Dept., Number</b>	CSC 2331	<b>Course Title</b>	Data Structures
<b>Semester Hours</b>	3	<b>Course Coordinator</b>	
<b>Year</b>	2006	<b>URL (if any):</b>	

### Current Catalog Description:

This course emphasizes data structures and the development and analysis of their associated algorithms. Specific data structures include linear lists, arrays, trees, graphs, stacks, queues, and tables. Pointer variables and recursion will be used. Applications will include searching and sorting. Prerequisite: CSC 1311.

### Textbook:

Data Structures with JAVA by William Ford, William Topp, Prentice Hall, 2005

### Course Goals:

1. To introduce varied data structures and algorithms.
2. To develop facility in thinking about abstract data types.

### Prerequisites by Topic:

1. Proficiency in writing JAVA programs involving primitive data types, control structures, loops, arrays, text processing, wrapper classes, I/O streams, exceptions, classes and methods, introduction to recursion, introduction to inheritance, and polymorphism.
2. Experience with elementary searching and sorting algorithms.
3. Mathematical maturity involved in writing proofs on the Calculus I level and familiarity with summation notation and common finite sums.

### Major Topics Covered in the Course (number of weeks):

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|--|-----|
| 1. Classes                                       | 1   |
| 2. Algorithms and Analysis                       | 2   |
| 3. Recursion                                     | 1.5 |
| 4. The array-based list collection, Linked Lists | 1.5 |
| 5. Iterators                                     | 1.5 |
| 6. Stacks  | 1.5 |
| 7. Queues and priority queues                    | 1.5 |
| 8. Binary Trees                                  | 1.5 |
| 9. Graphs  | 1   |
| 10. Professional Ethics                          | 1   |

### Laboratory Projects:

1. A program to review JAVA classes (2 weeks)
2. A program that involves algorithm analysis (2 weeks)
3. A program involving a stack and/or queue (3 weeks)
4. A program involving a tree (3 weeks)

### Estimate Curriculum Category Content (Semester hours)

Area	Core	Advanced	Area	Core	Advanced
Algorithms	1		Data Structures	2	
Software Design			Prog. Languages		
Comp. Arch.					

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**Oral and Written Communication:**

Typically, every student is required to submit at least 1 written report (not including exams, tests, quizzes, or commented programs) of 2-3 pages and to make 0 oral presentations. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.

**Social and Ethical Issues:**

Students write one paper on a computer ethics topic that is somewhat related to software. Usually the paper requires analysis of a controversial issue. Class time spent on it is limited to 20-30 minutes of explanation of the assignment. The paper is graded for content and style, but there are no exam questions relating to it.

**Theoretical Content:**

The theory of information hiding permeates all the data structures in the course, although not much class time is spent on it directly. There is an introduction to big-O notation (1 hour).

**Problem Analysis:**

The course analyzes the data in the abstract data structures, the actions taken on that data, and the common applications of the data structures. It also does running time analysis of implementations of data structures.

Some analysis issues arise because the students see many different data structures and more than one implementation of some of them: Which data structure is appropriate for a given application? Which implementation is the best for a given data structure?

The ethics paper usually involves analysis of a controversial topic.

**Open-Ended Design:**

Students study the designs of various implementations of data structures and the design of some programs that use the data structures.