

# California State University -- Northridge

## Comp 182 Data Structures & Program Design

Instructor: C. Robert Putnam

Office Hours:      Monday      1700-1800  
                         Tuesday      1300-1400  
                         Wednesday 1700-1800  
                         Thursday    1300-1400

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### **Course Description**

The use of appropriate data structures is vital to efficient and effective program construction. This course provides an introduction to selected data structures and the algorithms that are used to access the data held in the structures. We will review composite data types such as arrays, records, strings, and sets. The role of the abstract data type in program design will be investigated. We will also explore the definition, implementation, and application of data structures such as stacks, queues, linked lists, trees, and graphs. The use of recursion in program design and implementation will be studied. Algorithms will be evaluated and compared using the concept of time complexity. A comparative study of sorting and searching algorithms will be undertaken. The course is structured into lecture and laboratory segments. There will be some lecturing during the laboratory time periods. Students will design, implement and test Java programs related to material covered during lectures and in text. There will be two programming exams in the lab during the semester.

### **Prerequisites**

Math 104 or Math 105 or Math 150A    Minimum Grade ⇔ C  
Comp 110/ 110L                            Minimum Grade ⇔ C  
Freshman Composition  
Comp 182 and Comp 182L must be taken at the same time.

### **Textbook**

Carrano & Prichard  
Data Abstraction & Problem Solving with Java, 2<sup>nd</sup> ed.  
Addison Wesley                    0-321-30428-4

### **Materials**

USB Memory Stick for data storage & data transfer

### **Software**

Programming in Java with JDK 5.0 and Jgrasp in the lab. Java JDK 5.0 can be downloaded from <http://www.sun.com> and Jgrasp ( java development environment) can be downloaded from <http://www.eng.auburn.edu/grasp>. On-line Java Documentation is available at <http://java.sun.com/j2se/1.5.0/docs/api/index.html>.

### **Grading Policy**

The lecture and lab are integrated, thus you will receive the same grade for both the lecture and the lab. Plus and minus grading will be used.

### **Evaluation**

Midterm Exam	15%
Lab Programming Assignments	50%
Homework	5%
Final	<u>30%</u>
	100%

### **Print Quota**

The School of Engineering has established a print quota for all student accounts. The limit is 75 pages/month; if you exceed that amount, you may very well not be able to print anything from that account until the next month.

### **Storage Quota**

Students will be able to securely store documents on UBS Memory Sticks, diskettes, Zip drives and on the ECS system, i.e., the Z-drive subsystem. Documents stored on the local computer "C" drive may be deleted at any time by other students, instructors, and on a regular schedule by system administrators. The School of Engineering has established a storage quota for all student Z-drive accounts. The limit is 100MB; if you exceed that amount, you will not be able to store anything else until you delete items from the storage device.

### **Academic Dishonesty**

All instances of academic dishonesty on exams or programming projects will be reported to the Vice President of Student Affairs and will result in a grade of F on the assignment and may result in an F in the course. If you are not sure what is considered academic dishonesty, please ask your instructor for guidance.

### **Course Objectives**

1. Improve your ability to solve problems using computer programming.
2. Learn how to implement and use the basic data structures in Java.
3. Improve your ability to design, write, test, and debug computer programs.
4. Learn how to analyze algorithms.
5. Learn a variety of computer searching and sorting techniques.

### **Course Schedule (approximate)**

<b>Wk</b>	<b>Dates</b>	<b>Lecture</b>	<b>Text Reading</b>
<b>1</b>		<b>Introduction, Review of Java Classes, Java I/O, Review of Arrays</b>	<b>Ch 1, 2.1 , 3.1</b>
<b>2</b>		<b>Singly and Doubly Linked Lists</b>	<b>Ch 3.2,3.3</b>
<b>3</b>		<b>Singly and Doubly Linked Lists</b>	<b>Ch 3.4</b>
<b>4</b>		<b>Recursion, Binary Search</b>	<b>Ch 3.5</b>
<b>5</b>		<b>Intro to Algorithm Analysis; Analysis of some simple search and sort algorithms</b>	<b>Ch 4.1, 4.2</b>
<b>6</b>		<b>Java Exceptions, Abstract Data Types, Java Interfaces</b>	<b>Ch 2.3, 2.4</b>
<b>7</b>		<b>Stacks, Java Generics</b>	<b>Ch 2.4, 5.1</b>
<b>8</b>		<b>Stacks and Queues</b>	<b>Ch 5.2</b>
<b>9</b>		<b>Queues</b>	<b>Ch 5.3</b>
<b>10</b>		<b>Abstract Lists, ArrayLists</b>	<b>Ch 6.1-6.3</b>
<b>11</b>		<b>Trees, Binary Trees</b>	<b>Ch 7.1 – 7.2</b>
<b>12</b>		<b>Trees, Binary Search Trees</b>	<b>Ch 7.3, 10.1</b>
<b>13</b>		<b>Binary Search Trees</b>	<b>Ch 10.1</b>
<b>14</b>		<b>Merge Sort, Quicksort</b>	<b>Ch 11.1, 11.2</b>
<b>15</b>		<b>Java Collection Framework</b>	<b>Ch 6.4, Java documentation</b>
<b>16</b>		<b>FINAL EXAM</b>	