**Introduction to Computer Science using Java**

#### Revised and Expanded, January 2002

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This is a first course in Computer Science using the programming language Java. It covers the fundamentals of programming and of computer science.

For maximum benefit, go though these notes interactively, thinking about and answering the question at the bottom of each page. There are about 15 pages per chapter. If you spend about 3 minutes per page each chapter will take about 45 minutes; much more, if you copy and run some of the programs. If you are a beginning programmer, plan on spending more than a month with this.

These notes assume that you have the Java Development Kit (JDK) version 1.1 or later from Sun (http://www.javasoft.com) and a simple text editor such as NotePad. They may be used with more sophisticated environments, as well. For more about these notes check the [frequently asked questions.](http://chortle.ccsu.edu/cs151/FAQ.html)

Best viewed at 800 x 600

## Part 1: Hardware and Software

General computer science topics. Hardware and software. Analog and binary signals. Machine language and high level languages. Language translation and interpretation.

| [Chapter 1](http://chortle.ccsu.edu/cs151/Notes/chap01/ch01_1.html) | Introduction to Computer Systems | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap01/chap01quiz.html) | [Flash Cards.](http://chortle.ccsu.edu/cs151/Notes/chap01/flashCards01.html) |
| --- | --- | --- | --- |
| [Chapter 2](http://chortle.ccsu.edu/cs151/Notes/chap02/ch02_1.html) | Analog and Binary Signals | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap02/chap02quiz.html) | [Flash Cards.](http://chortle.ccsu.edu/cs151/Notes/chap02/flashCards02.html) |
| [Chapter 3](http://chortle.ccsu.edu/cs151/Notes/chap03/ch03_1.html) | Computer Memory | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap03/chap03quiz.html) | [Flash Cards.](http://chortle.ccsu.edu/cs151/Notes/chap03/flashCards03.html) |
| [Chapter 4](http://chortle.ccsu.edu/cs151/Notes/chap04/ch04_1.html) | The Processor | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap04/chap04quiz.html) | [Flash Cards.](http://chortle.ccsu.edu/cs151/Notes/chap04/flashCards04.html) |

## Part 2: Running Java Programs

How to run Java programs. Translating Java source code into bytecodes. How bytecodes are interpreted. How to create a Java program.

| [Chapter 5](http://chortle.ccsu.edu/cs151/Notes/chap05/ch05_1.html) | Introduction to Java | [Review.](http://chortle.ccsu.edu/cs151/Notes/chap05/fillBlankCh05.html) |
| --- | --- | --- |
| [Chapter 6](http://chortle.ccsu.edu/cs151/Notes/chap06/ch06_1.html) | Small Java Programs | [Review.](http://chortle.ccsu.edu/cs151/Notes/chap06/fillBlankCh06.html) |
| [Chapter 7](http://chortle.ccsu.edu/cs151/Notes/chap07/ch07_1.html) | How to Run the Example Programs | [Review.](http://chortle.ccsu.edu/cs151/Notes/chap07/fillBlankCh07.html) |

## Part 3: Java Programming

How to program in Java.

| [Chapter 8](http://chortle.ccsu.edu/cs151/Notes/chap08/ch08_1.html) | Primitive Data Types | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap08/chap08quiz.html) | [Flash Cards](http://chortle.ccsu.edu/cs151/Notes/chap08/flashCards08.html) | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap08/progExercises08.html) |
| --- | --- | --- | --- | --- |
| [Chapter 9](http://chortle.ccsu.edu/cs151/Notes/chap09/ch09_1.html) | Variables and the Assignment Statement | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap09/chap09quiz.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap09/progExercises09.html) |
| [Chapter 9B](http://chortle.ccsu.edu/cs151/Notes/chap09B/ch09B_1.html) | Expressions and Arithmetic Operators | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap09B/chap09Bquiz.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap09B/progExercises09B.html) |
| [Chapter 10](http://chortle.ccsu.edu/cs151/Notes/chap10/ch10_1.html) | Input and Output | [Review](http://chortle.ccsu.edu/cs151/Notes/chap10/fillBlankCh10.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap10/progExercises10.html) |
| [Chapter 11](http://chortle.ccsu.edu/cs151/Notes/chap11/ch11_1.html) | Floating Point Input | [Review](http://chortle.ccsu.edu/cs151/Notes/chap11/fillBlankCh11.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap11/progExercises11.html) |
| [Chapter 12](http://chortle.ccsu.edu/cs151/Notes/chap12/ch12_1.html) | The if Statement | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap12/chap12quiz.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap12/progExercises12.html) |
| [Chapter 13](http://chortle.ccsu.edu/cs151/Notes/chap13/ch13_1.html) | The Single Branch if Statement | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap13/chap13quiz.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap13/progExercises13.html) |
| [Chapter 14](http://chortle.ccsu.edu/cs151/Notes/chap14/ch14_1.html) | Boolean Expressions | [Review](http://chortle.ccsu.edu/cs151/Notes/chap14/fillBlankCh14.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap14/progExercises14.html) |
| [Chapter 15](http://chortle.ccsu.edu/cs151/Notes/chap15/ch15_1.html) | Loops and the while statement | [Review](http://chortle.ccsu.edu/cs151/Notes/chap15/fillBlankCh15.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap15/progExercises15.html) |
| [Chapter 16](http://chortle.ccsu.edu/cs151/Notes/chap16/ch16_1.html) | Counting Loops | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap16/chap16quiz.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap16/progExercises16.html) |
| [Chapter 17](http://chortle.ccsu.edu/cs151/Notes/chap17/ch17_1.html) | Examples of Counting Loops | [Review](http://chortle.ccsu.edu/cs151/Notes/chap17/fillBlankCh17.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap17/progExercises17.html) |
| [Chapter 18](http://chortle.ccsu.edu/cs151/Notes/chap18/ch18_1.html) | Sentinel-controlled Loops | [Review](http://chortle.ccsu.edu/cs151/Notes/chap18/fillBlankCh18.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap18/progExercises18.html) |
| [Chapter 19](http://chortle.ccsu.edu/cs151/Notes/chap19/ch19_1.html) | Result-controlled Loops | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap19/chap19quiz.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap19/progExercises19.html) |
| [Chapter 20](http://chortle.ccsu.edu/cs151/Notes/chap20/ch20_1.html) | Example Program -- Combination Lock | [Review](http://chortle.ccsu.edu/cs151/Notes/chap20/fillBlankCh20.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap20/progExercises20.html) |
| [Chapter 21](http://chortle.ccsu.edu/cs151/Notes/chap21/ch21_1.html) | File Input and Output | [Review](http://chortle.ccsu.edu/cs151/Notes/chap21/fillBlankCh21.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap21/progExercises21.html) |
| [Chapter 22](http://chortle.ccsu.edu/cs151/Notes/chap22/ch22_1.html) | Reading Data from a File | [Review](http://chortle.ccsu.edu/cs151/Notes/chap22/fillBlankCh22.html) |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap22/progExercises22.html) |
| [Chapter 23](http://chortle.ccsu.edu/cs151/Notes/chap23/ch23_1.html) | File Input Techniques |  |  | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap23/progExercises23.html) |

## Part 4: Object Oriented Programming

Object Oriented programming. Software objects.

| [Chapter 25](http://chortle.ccsu.edu/cs151/Notes/chap25/ch25_1.html) | Objects | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap25/chap25quiz.html) |  |
| --- | --- | --- | --- |
| [Chapter 26](http://chortle.ccsu.edu/cs151/Notes/chap26/ch26_1.html) | Object References | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap26/chap26quiz.html) |  |
| [Chapter 27](http://chortle.ccsu.edu/cs151/Notes/chap27/ch27_1.html) | More about Objects and Classes | [Review](http://chortle.ccsu.edu/cs151/Notes/chap27/fillBlankCh27.html) |  |
| [Chapter 28](http://chortle.ccsu.edu/cs151/Notes/chap28/ch28_1.html) | Method Parameters | [Review](http://chortle.ccsu.edu/cs151/Notes/chap28/fillBlankCh28.html) |  |
| [Chapter 29](http://chortle.ccsu.edu/cs151/Notes/chap29/ch29_1.html) | Strings and Object References | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap29/chap29quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap29/progExercises29.html) |
| [Chapter 30](http://chortle.ccsu.edu/cs151/Notes/chap30/ch30_1.html) | Defining your own Classes | [Review](http://chortle.ccsu.edu/cs151/Notes/chap30/fillBlankCh30.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap30/progExercises30.html) |
| [Chapter 31](http://chortle.ccsu.edu/cs151/Notes/chap31/ch31_1.html) | Class Design Example (miles per gallon) | [Review](http://chortle.ccsu.edu/cs151/Notes/chap31/fillBlankCh31.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap31/progExercises31.html) |
| [Chapter 32](http://chortle.ccsu.edu/cs151/Notes/chap32/ch32_1.html) | Class Design Example (checking account) | [Review](http://chortle.ccsu.edu/cs151/Notes/chap32/fillBlankCh32.html) |  |
| [Chapter 33](http://chortle.ccsu.edu/cs151/Notes/chap33/ch33_1.html) | Encapsulation and Visibility Modifiers | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap33/chap33quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap33/progExercises33.html) |
| [Chapter 34](http://chortle.ccsu.edu/cs151/Notes/chap34/ch34_1.html) | Parameters, Overloading, Local Variables | [Review](http://chortle.ccsu.edu/cs151/Notes/chap34/fillBlankCh34.html) |  |
| [Chapter 34B](http://chortle.ccsu.edu/cs151/Notes/chap34B/ch34B_1.html) | Object Parameters | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap34B/chap34Bquiz.html) |  |
| [Chapter 35](http://chortle.ccsu.edu/cs151/Notes/chap35/ch35_1.html) | Objects that Contain Objects | [Review](http://chortle.ccsu.edu/cs151/Notes/chap35/fillBlankCh35.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap35/progExercises35.html) |

## Part 5: Applets and Graphics

| [Chapter 36](http://chortle.ccsu.edu/cs151/Notes/chap36/ch36_1.html) | Applets | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap36/chap36quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap36/progExercises36.html) |
| --- | --- | --- | --- |
| [Chapter 37](http://chortle.ccsu.edu/cs151/Notes/chap37/ch37_1.html) | Applet Examples | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap37/chap37quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap37/progExercises37.html) |
| [Chapter 38](http://chortle.ccsu.edu/cs151/Notes/chap38/ch38_1.html) | More Applet Examples | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap38/chap38quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap38/progExercises38.html) |

## Part 6: More Java Programming Features

Incrementing and decrementing variables. Convenient ways to create loops.

| [Chapter 39](http://chortle.ccsu.edu/cs151/Notes/chap39/ch39_1.html) | Increment, Decrement, and Assignment Operators | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap39/chap39quiz.html) |  |
| --- | --- | --- | --- |
| [Chapter 40](http://chortle.ccsu.edu/cs151/Notes/chap40/ch40_1.html) | Boolean Expressions and Short-circuit Operators | [Review](http://chortle.ccsu.edu/cs151/Notes/chap40/fillBlankCh40.html) |  |
| [Chapter 41](http://chortle.ccsu.edu/cs151/Notes/chap41/ch41_1.html) | The for Statement | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap41/chap41quiz.html) |  |
| [Chapter 42](http://chortle.ccsu.edu/cs151/Notes/chap42/ch42_1.html) | More about the for Statement | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap42/chap42quiz.html) |  |
| [Chapter 43](http://chortle.ccsu.edu/cs151/Notes/chap43/ch43_1.html) | The Conditional Operator, and the switch Statement | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap43/chap43quiz.html) |  |
| [Chapter 44](http://chortle.ccsu.edu/cs151/Notes/chap44/ch44_1.html) | The do Statement | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap44/chap44quiz.html) |  |
| [Chapter 46](http://chortle.ccsu.edu/cs151/Notes/chap46/ch46_1.html) | Introduction to Arrays | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap46/chap46quiz.html) |  |
| [Chapter 47](http://chortle.ccsu.edu/cs151/Notes/chap47/ch47_1.html) | Common Array Algorithms | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap47/chap47quiz.html) |  |
| [Chapter 48](http://chortle.ccsu.edu/cs151/Notes/chap48/ch48_1.html) | Arrays as Parameters | [Review](http://chortle.ccsu.edu/cs151/Notes/chap48/fillBlankCh48.html) |  |
| [Chapter 49](http://chortle.ccsu.edu/cs151/Notes/chap49/ch49_1.html) | Methods that Change Arrays | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap49/chap49quiz.html) |  |
| [Chapter 49B](http://chortle.ccsu.edu/cs151/Notes/chap49B/ch49B_1.html) | Arrays of Objects and Linear Search | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap49B/chap49Bquiz.html) | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap49B/progExercises49B.html) |
| [Chapter 49C](http://chortle.ccsu.edu/cs151/Notes/chap49C/ch49C_1.html) | Two-dimensional Arrays | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap49C/chap49Cquiz.html) |  |
| [Chapter 49D](http://chortle.ccsu.edu/cs151/Notes/chap49D/ch49D_1.html) | StringBuffers and StringTokenizers | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap49D/chap49Dquiz.html) | [Programming Exercises](http://chortle.ccsu.edu/cs151/Notes/chap49D/progExercises49D.html) |

## Part 7: Advanced Object Oriented Programming

Advanced features of object oriented programming.

| [Chapter 50](http://chortle.ccsu.edu/cs151/Notes/chap50/ch50_1.html) | Introduction to Inheritance | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap50/chap50quiz.html) |
| --- | --- | --- |
| [Chapter 51](http://chortle.ccsu.edu/cs151/Notes/chap51/ch51_1.html) | Abstract Classes and Polymorphism | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap51/chap51quiz.html) |
| [Chapter 52](http://chortle.ccsu.edu/cs151/Notes/chap52/ch52_1.html) | More about Polymorphism | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap52/chap52quiz.html) |
| [Chapter 53](http://chortle.ccsu.edu/cs151/Notes/chap53/ch53_1.html) | Interfaces | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap53/chap53quiz.html) |
| [Chapter 54](http://chortle.ccsu.edu/cs151/Notes/chap54/ch54_1.html) | Vectors and Enumerations | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap54/chap54quiz.html) |

## Part 8: Graphical User Interface Programming

Graphical user interfaces. Project Swing and the Abstract Windowing Toolkit.

| [Chapter 55](http://chortle.ccsu.edu/cs151/Notes/chap55/ch55_1.html) | Introduction to GUI Programming | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap55/chap55quiz.html) |
| --- | --- | --- |
| [Chapter 56](http://chortle.ccsu.edu/cs151/Notes/chap56/ch56_1.html) | Swing Frames | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap56/chap56quiz.html) |
| [Chapter 57](http://chortle.ccsu.edu/cs151/Notes/chap57/ch57_1.html) | Event Listeners | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap57/chap57quiz.html) |
| [Chapter 58](http://chortle.ccsu.edu/cs151/Notes/chap58/ch58_1.html) | Adding Buttons to a Frame | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap58/chap58quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap58/progExercises58.html) |
| [Chapter 59](http://chortle.ccsu.edu/cs151/Notes/chap59/ch59_1.html) | Buttons and Action Events | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap59/chap59quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap59/progExercises59.html) |
| [Chapter 60](http://chortle.ccsu.edu/cs151/Notes/chap60/ch60_1.html) | Swing Text Fields and Labels | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap60/chap60quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap60/progExercises60.html) |
| [Chapter 61](http://chortle.ccsu.edu/cs151/Notes/chap61/ch61_1.html) | Component Layout | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap61/chap61quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap61/progExercises61.html) |
| [Chapter 62](http://chortle.ccsu.edu/cs151/Notes/chap62/ch62_1.html) | JPanel and BoxLayout |  |  |
| [Chapter 63](http://chortle.ccsu.edu/cs151/Notes/chap63/ch63_1.html) | Radio Buttons and BorderLayout |  | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap63/progExercises63.html) |
| [Chapter 64](http://chortle.ccsu.edu/cs151/Notes/chap64/ch64_1.html) | Sliders and Change Events |  |  |

## Part 9: Exceptions and IO Streams

Exceptions. Disk file input and output.

| [Chapter 80](http://chortle.ccsu.edu/cs151/Notes/chap80/ch80_1.html) | Exceptions and Errors | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap80/chap80quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap80/progExercises80.html) |
| --- | --- | --- | --- |
| [Chapter 81](http://chortle.ccsu.edu/cs151/Notes/chap81/ch81_1.html) | More about Exceptions | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap81/chap81quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap81/progExercises81.html) |
| [Chapter 82](http://chortle.ccsu.edu/cs151/Notes/chap82/ch82_1.html) | Input and Output Streams | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap82/chap82quiz.html) |  |
| [Chapter 83](http://chortle.ccsu.edu/cs151/Notes/chap83/ch83_1.html) | Writing Text Files |  | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap83/progExercises83.html) |
| [Chapter 84](http://chortle.ccsu.edu/cs151/Notes/chap84/ch84_1.html) | Reading Text Files |  | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap84/progExercises84.html) |
| [Chapter 85](http://chortle.ccsu.edu/cs151/Notes/chap85/ch85_1.html) | Writing Binary Files | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap85/chap85quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap85/progExercises85.html) |
| [Chapter 86](http://chortle.ccsu.edu/cs151/Notes/chap86/ch86_1.html) | Reading Binary Files | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap86/chap86quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/Notes/chap86/progExercises86.html) |
| [Chapter 87](http://chortle.ccsu.edu/cs151/Notes/chap87/ch87_1.html) | The File Class | [Quiz](http://chortle.ccsu.edu/cs151/Notes/chap87/chap87quiz.html) |

## Appendix

## Appendix A --- Introduction to HTML

* [Part 1 --- Pages, Paragraphs, and Fonts.](http://chortle.ccsu.edu/cs151/Notes/appendixA/htmlPart1_1.html)
* [Part 2 --- Lists, Links, and URLs.](http://chortle.ccsu.edu/cs151/Notes/appendixA/htmlPart2_1.html)
* [Part 3 --- Applets, Images, and Tables.](http://chortle.ccsu.edu/cs151/Notes/appendixA/htmlPart3_1.html)

## Appendix B --- GUI Design with the AWT

| [Chapter 55](http://chortle.ccsu.edu/cs151/AWTChapters/chap55/ch55_1.html) | Beginning GUI Programming | [Quiz](http://chortle.ccsu.edu/cs151/AWTChapters/chap55/chap55quiz.html) |
| --- | --- | --- |
| [Chapter 56](http://chortle.ccsu.edu/cs151/AWTChapters/chap56/ch56_1.html) | Event Listeners | [Quiz](http://chortle.ccsu.edu/cs151/AWTChapters/chap56/chap56quiz.html) |
| [Chapter 57](http://chortle.ccsu.edu/cs151/AWTChapters/chap57/ch57_1.html) | Adding GUI Components to a Container | [Quiz](http://chortle.ccsu.edu/cs151/AWTChapters/chap57/chap57quiz.html) |
| [Chapter 58](http://chortle.ccsu.edu/cs151/AWTChapters/chap58/ch58_1.html) | More about Action Events | [Programming Exercises.](http://chortle.ccsu.edu/cs151/AWTChapters/chap58/progExercises58.html) |
| [Chapter 59](http://chortle.ccsu.edu/cs151/AWTChapters/chap59/ch59_1.html) | Example GUI Application | [Programming Exercises.](http://chortle.ccsu.edu/cs151/AWTChapters/chap59/progExercises59.html) |
| [Chapter 60](http://chortle.ccsu.edu/cs151/AWTChapters/chap60/ch60_1.html) | A Larger GUI Application | [Programming Exercises.](http://chortle.ccsu.edu/cs151/AWTChapters/chap60/progExercises60.html) |
| [Chapter 61](http://chortle.ccsu.edu/cs151/AWTChapters/chap61/ch61_1.html) | Components Layout Techniques | [Quiz](http://chortle.ccsu.edu/cs151/AWTChapters/chap61/chap61quiz.html) | [Programming Exercises.](http://chortle.ccsu.edu/cs151/AWTChapters/chap61/progExercises61.html) |
| [Chapter 62](http://chortle.ccsu.edu/cs151/AWTChapters/chap62/ch62_1.html) | AWT Class Hierarchy |

## Index and Search

The **Index** is most like the index in a traditional book. The terms in the index were selected by hand. Also, you can **Search** these notes using google.com. Searching is likely to produce many irrelevant "hits".

* [Index](http://chortle.ccsu.edu/cs151/Notes/index.html) Book-type index.
* Search with Google.com. Enter your search terms:

## DownLoads

This zip file contains all the material as of Jan 23, 2002. Permission is granted to download it for personal use, or for use in an educational institution.

* [Java Lessons zip file](ftp://chortle.ccsu.edu/CS151FTP/JavaNotes.zip)  3,531,554 bytes
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