Table of Contents

1. Intro	Dauction 1	
1.2 1.3 1.4 1.5	A brief history of computing 2 What is computer science? 4 An overview of computer hardware 5 Algorithms 7 Stages in the programming process 8	
	Java and the object-oriented paradigm Java and the World Wide Web 17	
2. Programming by Example 21		
2.2 2.3	The "hello world" program 22 Perspectives on the programming process 26 A program to add two numbers 26 Classes and objects 31	
3. Expressions 39		
3.2 3.3 3.4	Primitive data types 41 Constants and variables 42 Operators and operands 46 Assignment statements 53 Programming idioms and patterns 56	
4. Statement Forms 63		
4.2 4.3 4.4 4.5 4.6 4.7	Simple statements 64 Control statements 66 Boolean data 67 The if statement 73 The switch statement 78 The concept of iteration 79 The while statement 85 The for statement 90	
5. Methods 99		
5.2	A quick overview of methods 100 Methods and the object-oriented paradigm 103 Writing your own methods 108	
5.4	Mechanics of the method-calling process Algorithmic methods 125	

6. Objects and Classes 135
 6.1 Using the RandomGenerator class 136 6.2 Defining your own classes 143 6.3 Defining a class to represent rational numbers 150
7. The Object Memory Model 165
 7.1 The structure of memory 166 7.2 Allocation of memory to variables 170 7.3 Primitive types vs. objects 176 7.4 Linking objects together 180
8. Object-Oriented Graphics 189
8.1 The acm.graphics model 190 8.2 The graphics class hierarchy 191 8.3 Facilities available in the GraphicsProgram class 19 8.4 Animation and interactivity 199 8.5 Creating compound objects 208 8.6 Principles of good object-oriented design 210
9. Strings and Characters 225
 9.1 The principle of enumeration 226 9.2 Characters 228 9.3 Strings as an abstract idea 237 9.4 Using the methods in the string class 238
10. Arrays and ArrayLists 253
10.1 Introduction to arrays 254 10.2 Internal representation of arrays 258 10.3 Passing arrays as parameters 259 10.4 The ArrayList class 263 10.5 Using arrays for tabulation 267 10.6 Initialization of arrays 268 10.7 Multidimensional arrays 270
11. Searching and Sorting 283
11.1 Searching 284 11.2 Sorting 292

Index

307

A note on the cover image: The cover of The Art and Science of C showed a picture of Patience, one of the two stone lions that guard the entrance to the New York Public Library. Addison-Wesley and I chose that image both to emphasize the library-based approach adopted by the text and because patience is an essential skill in programming. In 2003, the United States Postal Service decided to put Patience on a stamp, which gave those of us who have a special attachment to that lion a great deal of inner pleasure.