Building Java Programs Textbook mapping to Shoreline's CS141: Java I

Key: Core Concept Recommended

Chapter	Topics	Week	Day
Chapter 1: Introduction to Java Programming	1.1 Basic Computing Concepts • Why Programming? • Hardware and Software • The Digital Realm • Why Java? • The Process of Programming • The Java Programming Environment 1.2 And Now--Java • String Literals (Strings) • System.out.println • Escape Sequences • print versus println • Identifiers and Keywords • A Complex Example: DrawFigures1 • Comments and Readability 1.3 Program Errors • Syntax Errors • Logic Errors (bugs) 1.4 Procedural Decomposition • Static Methods • Flow of Control • Methods That Call Other Methods • An Example Runtime Error 1.5 Case Study: DrawFigures • Structured Version • Final Version without Redundancy • Analysis of Flow of Execution	1	01

Chapter	Topics	Week	Day
Chapter 2: Primitive Data and Definite Loops	2.1 Basic Data Concepts • Primitive Types • Expressions • Literals • Arithmetic Operators • Precedence • Mixing Types and Casting 2.2 Variables • Assignment/Declaration Variations • String Concatenation • Increment/Decrement Operators • Variables and Mixing Types 2.3 The for Loop • Tracing for Loops • for Loop Patterns • Nested for Loops 2.4 Managing Complexity • Scope • Pseudocode • Class Constants 2.5 Case Study: A Complex Figure • Problem Decomposition and Pseudocode • Initial Structured Version • Adding a Class Constant • Further Variations	1	02
Chapter 3: Introduction to Parameters and Objects	3.1 Parameters • The Mechanics of Parameters • Limitations of Parameters • Multiple Parameters • Parameters Versus Constants • Overloading of Methods 3.2 Methods that Return Values • The Math Class • Defining Methods that Return Values 3.3 Using Objects • String Objects • Interactive Programs and Scanner Objects • Sample Interactive Program 3.4 Case Study: Projectile Trajectory • Unstructured Solution • Structured Solution	2	03

Chapter	Topics	Week	Day
Supplement 3G: Graphics	3G.1 Introduction to Graphics • DrawingPanel • Drawing Lines and Shapes • Colors • Drawing with Loops • Text and Fonts • Images 3G.2 Procedural Decomposition with Graphics • A Larger Example: DrawDiamonds 3G.3 Case Study: Pyramids • Unstructured Partial Solution • Generalizing the Drawing of Pyramids • Complete Structured Solution	2	04
Chapter 4: Conditional Execution	4.1 if/else Statements • Relational Operators • Nested if/else Statements • Object Equality • Factoring if/else Statements • Multiple Conditions 4.2 Cumulative Algorithms • Cumulative Sum • Min/Max Loops • Cumulative Sum with if • Roundoff Errors 4.3 Text Processing • The char Type • char versus int • Cumulative Text Algorithms • System.out.printf 4.4 Methods with Conditional Execution • Preconditions and Postconditions • Throwing Exceptions • Revisiting Return Values • Reasoning about Paths 4.5 Case Study: Body Mass Index • One-person Unstructured Solution • Two-person Unstructured Solution • Two-person Structured Solution • Procedural Design Heuristics	3	05, 06

Chapter	Topics	Week	Day
Chapter 5: Program Logic and Indefinite Loops	5.1 The while Loop • A Loop to Find the Smallest Divisor • Random Numbers • Simulations • The do/while Loop 5.2 Fencepost Algorithms • Sentinel Loops • Fencepost with if 5.3 The boolean Type • Logical Operators • Short-Circuited Evaluation • boolean Variables and Flags • Boolean Zen • Negating Boolean Expressions 5.4 User Errors • Scanner Lookahead • Handling User Errors 5.5 Assertions and Program Logic • Reasoning About Assertions • A Detailed Assertions Example 5.6 Case Study: NumberGuess • Initial Version without Hinting • Randomized Version with Hinting • Final Robust Version	4	07, 08
Midterm	Chapters 1-5	5	09, 10
Chapter 6: File Processing	6.1 File Reading Basics • Data, Data Everywhere • File Basics • Reading a File with a Scanner 6.2 Details of Token-Based Processing • Structure of Files and Consuming Input • Scanner Parameters • Paths and Directories • A More Complex Input File 6.3 Line-Based Processing • String Scanners and Line/Token Combinations 6.4 Advanced File Processing • Output Files with PrintStream • Guaranteeing that Files Can Be Read 6.5 Case Study: ZIP Code Lookup	6	11, 12

Chapter	Topics	Week	Day
Chapter 7: Arrays	7.1 Array Basics • Constructing and Traversing an Array • Accessing an Array • A Complete Array Program • Random Access • Arrays and Methods • The For-Each Loop • Initializing Arrays • The Arrays Class 7.2 Array Traversal Algorithms • Printing an Array • Searching and Replacing • Testing for Equality • Reversing an Array • String Traversal Algorithms 7.3 Reference Semantics • Multiple Objects 7.4 Advanced Array Techniques • Shifting Values in an Array • Arrays of Objects • Command Line Arguments • Nested Loop Algorithms 7.5 Multidimensional Arrays • Rectangular Two-Dimensional Arrays • Jagged Arrays 7.6 Arrays of Pixels 7.7 Case Study: Benford's Law • Tallying values • Completing the Program	7	13, 14

Chapter	Topics	Week	Day
Chapter 8: Classes	8.1 Object-Oriented Programming • Classes and Objects • Point Objects 8.2 Object State and Behavior • Object State: Fields • Object Behavior: Methods • The Implicit Parameter • Mutators and Accessors • The toString Method 8.3 Object Initialization: Constructors • The Keyword this • Multiple Constructors 8.4 Encapsulation • Private Data Fields • Class Invariants • Changing Internal Implementations 8.5 Case Study: Designing a Stock Class • Object-Oriented Design Heuristics • Stock Fields and Method Headers • Stock Method and Constructor Implementation	8	15, 16

Chapter	Topics	Week	Day
Chapter 9: Inheritance and Interfaces	9.1 Inheritance Basics • Non-programming Hierarchies • Extending a Class • Overriding Methods 9.2 Interacting with the Superclass • Calling Overridden Methods • Accessing Inherited Fields • Calling a Superclass's Constructor • DividendStock Behavior • The Object Class • The equals Method • The instanceof Keyword 9.3 Polymorphism • Polymorphism Mechanics • Interpreting Inheritance Code • Interpreting Complex Calls 9.4 Inheritance and Design • A Misuse of Inheritance • Is-a versus Has-a Relationships • Graphics2D 9.5 Interfaces • An Interface for Shapes • Implementing an Interface • Benefits of Interfaces 9.6 Case Study: Financial Class Hierarchy • Designing the Classes • Redundant Implementation • Abstract Classes	9	17
Chapter 10: ArrayLists	10.1 ArrayLists • Basic ArrayList Operations • ArrayList Searching Methods • A Complete ArrayList Program • Adding to and Removing from an ArrayList • Using the For-Each Loop with ArrayLists • Wrapper Classes 10.2 The Comparable Interface • Natural Ordering and compareTo • Implementing the Comparable Interface 10.3 Case Study: Vocabulary Comparison • Some Efficiency Considerations • Version 1: Compute Vocabulary • Version 2: Compute Overlap • Version 3: Complete Program	9	18, 19
Final Review	Chapters 1-10	10	20