

Java Programming

For Introductory Computer Science

Course Syllabus and Planner

Course Overview

CompuScholar's **Java Programming** curriculum is a one-year (two-semester) course that teaches students to code in the Java language. It is aligned to numerous state and national standards for courses such as "Computer Programming I" or similar titles.

Other introductory programming courses are not required. Students merely need to have typical computer usage skills prior to starting this course.

<p>Java Programming can also be used as an Advanced Placement (AP) "Computer Science A" course. For details, please see our Syllabus and Planner guide for AP CS A teachers.</p>

Course Material

The course consists of the following student-facing elements:

- **Instructional Videos** – optional (not required), but enjoyed by many students as an audio-visual introduction and reinforcement of the lesson topics.
- **Lesson Text** – required reading, contains full topic details and live coding exercises
- **Quizzes and Exams** – multiple-choice and automatically graded by our system
- **Chapter Activities** – hands-on projects, submitted for a grade

Teachers additionally have access to:

- **Teacher's Guides** – for each lesson, with suggested classroom discussion questions
 - **Quiz and Exam Answer Keys** – PDFs for quick reference
 - **Activity Solution Guides** – fully coded activity solutions for each chapter activity
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Programming Environment and Device Requirements

CompuScholar provides an in-browser Java coding environment. This online feature may be used by students to complete all exercises and activities in all “core” chapters. When using our online coding environment:

- **No local software installation is needed.**
- **All activities can be completed from any web browser on any device (including Chromebooks and tablets).**

Later, optional chapters contain a mixture of activities. Teachers may select any of these topics for students as desired to meet specific state requirements. Some optional activities can be done in CompuScholar’s online environment, while others are completed using an external IDE.

When needed, we recommend a locally installed JDK and Eclipse platform for an external IDE (see chapters 28 and 29 for instructions). Teachers may also select any other locally installed or online IDE. **Device requirements for your optional, external IDE depend on the IDE selected.**

Project Grading

Each chapter normally contains one or more hands-on, graded activities. The activities in **all “core” chapters are fully auto-graded by our system.** Teachers have complete control over the auto-graded results.

Some activities in later, optional chapters are free-form (creative) or completed in an external IDE. The teacher is responsible for grading those creative or external projects.

Course Navigation

Chapters 1 - 24 are considered “core” curriculum that cover the required topics in most state computer science courses. Students are generally advised to complete these chapters, in sequence. If a specific topic is not required by your state or appropriate for your classroom (e.g., recursion or sorting), then teachers may choose to skip those chapters.

Chapters 25 – 33 contain optional topics that may not be required in every state. Teachers are encouraged to review the optional material and direct students to any topic(s) that are a good fit for their local classrooms. Some optional chapters require use of an external IDE and/or will be graded by the teacher.

Supplemental Chapters 1 – 4 contain a variety of topics that may be required by individual states to satisfy requirements for career exploration, computing in modern society, computer networking and other enrichment topics. Teachers may optionally select any of these topics for students, time permitting.

Course Planner

The following pages contain a suggested timeline for completing course content over two semesters. A typical school year consists of 36 calendar weeks or 180 days of school. After completing the “core” content, most classes will have approximately 6-8 weeks left in the school year to explore optional and supplemental topics. Teachers may direct students to any appropriate topics, time permitting.

Each “day” listed below represents one typical day or class period of 45 – 60 minutes. In most cases, we anticipate students will complete one lesson per day (including the quiz), 1 day per lab, and 1 day per chapter test. Some classes may move faster or slower than the suggested pace.



Semester 1 Timeline

Days	CompuScholar Chapter	Notes
6	Chapter 1: Computing Concepts <ul style="list-style-type: none">* Evolution of Computers* Computer Hardware* Computer Software* Computer Ethics* Computer Security	Common curricular requirements
6	Chapter 2: Getting Started with Java <ul style="list-style-type: none">* Common Programming Languages* The Java Platform* Writing Your First Program* Help and Reference Documentation ACTIVITY: Shopping List	Online, auto-graded
5	Chapter 3: Data Types and Variables <ul style="list-style-type: none">* Primitive Data Types* Variables* Printing Data ACTIVITY: Treasure Map	Online, auto-graded
5	Chapter 4: Working with Numbers <ul style="list-style-type: none">* Simple Math Operations* Compound Assignments and Shortcuts* Type Casting and Truncation ACTIVITY: Magic Math	Online, auto-graded
7	Chapter 5: Introducing Objects <ul style="list-style-type: none">* Java Classes* Reference Variables and Strings* Properties and Constructors* Calling Methods* User Input with Scanner ACTIVITY: Sketch Robot	Online, auto-graded



5	Chapter 6: Working with Strings <ul style="list-style-type: none">* Comparing Strings* Common String Operations* Formatting and Building Strings ACTIVITY: String Theory	Online, auto-graded
5	Chapter 7: Numbering Systems and Java Math <ul style="list-style-type: none">* Java Wrapper Classes & Numeric Conversion* Numbers in Binary, Octal and Hex* Java Math Class ACTIVITY: Math Factory	Online, auto-graded
6	Chapter 8: Logic and Decision-Making <ul style="list-style-type: none">* Logical Expressions and Relational Operators* Making Decisions with if()* Using "else-if" and "else"* The "switch" Statement ACTIVITY: Banking System	Online, auto-graded
5	Chapter 9: More Complex Logic <ul style="list-style-type: none">* Comparing Objects and References* Compound Expressions* Boolean Algebra and Truth Tables ACTIVITY: Wild Card	Online, auto-graded
5	Chapter 10: Handling Exceptions <ul style="list-style-type: none">* Understanding Exceptions* Catching Exceptions* Validating User Input ACTIVITY: Calculator Madness	Online, auto-graded
4	Chapter 11: Debugging <ul style="list-style-type: none">* Finding Runtime Errors* Debugger Concepts ACTIVITY: Bug Hunt	Online, auto-graded



6	Chapter 12: Iteration <ul style="list-style-type: none">* For Loops* While Loops* Continue, Break and Return* Nested Loops ACTIVITY: Fun Factorials	Online, auto-graded
6	Chapter 13: Algorithms <ul style="list-style-type: none">* Designing with Flowcharts* Writing Pseudocode* Common Mathematical Algorithms* Common String Algorithms ACTIVITY: Meal Time	Online, auto-graded
7	Chapter 14: Creating Java Classes <ul style="list-style-type: none">* Object-Oriented Concepts* Defining Classes and Packages* Class Properties* Constructors* Class Methods ACTIVITY: Dog House	Online, auto-graded
7	Chapter 15: Working with Methods <ul style="list-style-type: none">* Documentation and Design* Variable Scope and Access* Data Encapsulation* Method Overloading* Object Interfaces ACTIVITY: Let's Go Racing!	Online, auto-graded
5	Chapter 16: Static Concepts <ul style="list-style-type: none">* Static Properties* Static Methods* Static, Object and "this" References ACTIVITY: Art School	Online, auto-graded
4	Chapter 17: Mid-Term Project <ul style="list-style-type: none">* Introducing the "Remote Control" Project ACTIVITY: Creating the Schedule ACTIVITY: Building a Television ACTIVITY: Defining the Remote	Online, auto-graded
94	Approximate Days, Semester 1, "core" chapters	



Semester 2 Timeline

Days	CompuScholar Chapter	Notes
7	Chapter 18: 1D Arrays <ul style="list-style-type: none">* Array Concepts* Array Traversal* Iterators and Enhanced for() loops* Array Algorithms* More Array Algorithms ACTIVITY: Whack-A-Mole	Online, auto-graded
6	Chapter 19: Lists and ArrayLists <ul style="list-style-type: none">* Java Lists* ArrayLists* Iterators and Enhanced for() Loops* Algorithms with ArrayLists ACTIVITY: Train Yard Jumble	Online, auto-graded
7	Chapter 20: Searching and Sorting <ul style="list-style-type: none">* Bubble Sort* Selection Sort* Insertion Sort* Sequential and Binary Searches ACTIVITY: Ducks in a Row	Online, auto-graded
6	Chapter 21: 2D Arrays <ul style="list-style-type: none">* 2D Arrays* Traversal and Ordering* Array of Arrays* 2D Array Algorithms ACTIVITY: Gold Rush	Online, auto-graded
5	Chapter 22: Inheritance <ul style="list-style-type: none">* Superclass and Subclass Concepts* Subclass Constructors* Using Superclass and Subclass References ACTIVITY: Lab Rats	Online, auto-graded



6	Chapter 23: Polymorphism * Overriding Superclass Methods * Abstract Classes and Methods * Using Superclass Features with "super" * The "Object" Superclass ACTIVITY: Social Ladder	Online, auto-graded
5	Chapter 24: Recursion * Recursion * Recursive Binary Search * Merge Sort ACTIVITY: File Explorer	Online, auto-graded
42	Approximate Days in Semester 2 (all "core" chapters complete at this point)	

Classes who complete the first 24 chapters at this point have spent approximately 136 days and completed all "core" requirements. Remaining class time should be spent in any desired, teacher-selected topics from Chapters 25 – 33 or the Supplemental Chapters.

Please see below for information on the **optional chapters and Supplemental topics**.



The following table suggests the timeline needed for each **optional or supplemental chapter**, along with notes as to the programming environment and grading approach. There are more “optional” chapters available than students can complete in a single year, so teachers can pick topics as time permits!

Days	CompuScholar Chapter	Notes
5	Chapter 25: File Access * Data Streams * Reading and Writing Text Data * Reading and Writing Binary Data ACTIVITY: Address CSV	Online, auto-graded
5	Chapter 26: Object Composition and Copying * Functional Decomposition * Composite Classes * Copying Objects ACTIVITY: Designing a Composite Class	Document submission, teacher graded
10-15	Chapter 27: Team Project * Design Processes and Teamwork * Requirements and Design Documents ACTIVITY: Team Project Requirements ACTIVITY: Project Design ACTIVITY: Team Project Implementation * Testing Your Code ACTIVITY: Team Project Testing	CompuScholar online environment or external IDE, teacher-graded project
3	Chapter 28: Running Java Locally * Installing the JDK * Local Source Code * Building and Running from the Command Line	“How-to” chapter to create local development environment
4	Chapter 29: The Eclipse IDE * Introducing Eclipse * Eclipse Java IDE Walk-Through * Creating an Eclipse Project * The Eclipse Debugger	“How-to” chapter to install and use a local IDE



6	Chapter 30: Graphical Java Programs <ul style="list-style-type: none">* Java Swing* Creating a Simple Window* Event-Driven Programming* Layout Managers ACTIVITY: Phone Dialer	Requires external IDE (e.g., Eclipse) with Java Swing support. Teacher-graded projects.
5	Chapter 31: Swing Input Controls <ul style="list-style-type: none">* Text and Numeric Input* List Input* Option Input ACTIVITY: Pizza Place	
5	Chapter 32: Vector and Bitmap Images <ul style="list-style-type: none">* Screen Coordinates* Drawing Shapes* Drawing Images ACTIVITY: Sky Art	
4	Chapter 33: Program Efficiency <ul style="list-style-type: none">* Algorithm Performance (Big-O)* Measuring Sorting Efficiency ACTIVITY: Comparison of Sorting Algorithms	External IDE, teacher-graded project
12	Supplemental Chapter 1: Enrichment Topics	See individual lessons and activities for programming environment and grading approach.
8	Supplemental Chapter 2: Software and Industry	Offline work, teacher-graded projects
4	Supplemental Chapter 3: Computers and Modern Society	Offline work, teacher-graded projects
6	Supplemental Chapter 4: Computer Networking	Offline work, teacher-graded projects
