

Java Course Syllabus

(Prepare for AP CSA)

General Learning Process

- For each concept learned, there will be interactive challenge problems presented to each student.
- At the end of each class, homework projects incorporating all of the lessons for the day will be assigned.
 - This homework is expected to be completed by the start of the next class.

Data Types

Variables

- Understanding variables
- Declaring variables
 - Variable naming conventions
- Assigning values to variables
- Getting user input

Primitive Data Types

- Declaration of integers, floats, chars, and booleans
- Understanding the difference between integers, floats, chars, and booleans
- Arithmetic Operators
 - Addition
 - Subtraction
 - Multiplication
 - Division (including integer division)

- Exponents
- Modulo

Strings

- Understanding string class
- Declaration of strings
- String functions
 - Length of string
 - Concatenation
 - String methods
- Receiving user string input
- Converting strings to integers and vice-versa

Arrays, Lists, and Maps

- Declaration of arrays, lists, and maps
- Understanding the difference between arrays, lists, and maps
- Searching arrays, lists, and maps through index
- Array, list, map methods
 - Appending items
 - Inserting items
 - Removing items
 - Sorting
- Separating Strings into lists (Helpful for reading CSV files when interpreting data)
- Nesting arrays, lists, and maps

Conditional Statements

- How If / Else If / Else Statements work
- Comparison Operators
 - Greater than
 - Less than

- Equal to
 - Not equal to
 - Greater or equal than
 - Less than or equal than
- Logical Operators
 - And
 - Or
 - Not
- Booleans
 - Definition
 - Implementation
- Switch Case Statements
 - Implementation

Loops

- Understanding the differences between while, do while, and for loops
 - Iteration of arrays with for loops
- Declaring while and for loops
- Loop control statements
 - Break
 - Continue

Methods

- What is a method?
 - Arguments
 - Parameters
 - Signature
- Understanding the scope of variables
 - Global variables
 - Local variables
 - Nonlocal variables

- Defining a method
 - Adding parameters to a method
- Returning an output
 - Implementing this output in the remainder of the program
- Calling/using a method
- Constructors

Classes

- Understanding object oriented programming
- Creating classes
 - Constructors
 - Objects
 - Attributes
 - Methods
 - Access modifiers
 - Public
 - Private
 - Protected
- Understanding inheritance
 - Child (derived) vs parent (base) classes
 - How attributes and methods are passed through the classes
 - Method overriding
 - Using super constructors
- Understanding encapsulation and implementing it
- Understanding polymorphism and implementing it
- Understanding multiple inheritance, multilevel inheritance, and method resolution order
- Using operator overloading

Inheritance and Recursion

- Working with inheritance
 - Create interfaces and parent classes
- Understanding and implementing recursion
 - Base case
 - Termination conditions
- Using import
 - Working with external Java packages
 - Creating your own Java packages to efficiently structure code

Interfaces vs Classes and Packages

- Learn about interfaces and how they are used
 - Compare to an abstract class
- Understand when to use an interface vs class
- Using import
 - Sample packages
 - Creating and using modules

File Handling

- Work with packages to read, write, and delete files
- Understand the applications of file handling as a local database

Asynchronous Threading

- Understand the difference between synchronous and asynchronous programming
- Know when to use threads and for what purpose
- Practice using threads for API calls

Curriculum Timeline

Beginners

Class #	Topics
1	<ul style="list-style-type: none">● Understanding variables● Declaring variables and assigning them values● Using variables in code
2	<ul style="list-style-type: none">● Primitive Data Types Part 1<ul style="list-style-type: none">○ Declaration of integers, floats, and booleans○ Understanding the difference between integers, floats, and booleans
3	<ul style="list-style-type: none">● Primitive Data Types Part 2<ul style="list-style-type: none">○ Arithmetic Operators<ul style="list-style-type: none">■ Addition■ Subtraction■ Multiplication■ Division (including integer division)■ Exponents● Modulo
4	<ul style="list-style-type: none">● Strings<ul style="list-style-type: none">○ Understanding string class○ Declaration of strings○ String functions<ul style="list-style-type: none">■ Length of string■ Concatenation■ String methods○ Receiving user string input○ Converting strings to integers and vice-versa

5	<ul style="list-style-type: none"> ● Arrays, Lists, and Maps Part 1 <ul style="list-style-type: none"> ○ Declaration of arrays, lists, and maps ○ Understanding the difference between arrays, lists, and maps
6	<ul style="list-style-type: none"> ● Arrays, Lists, and Maps Part 2 <ul style="list-style-type: none"> ○ Searching arrays, lists, and maps through index ○ Array, list, map methods <ul style="list-style-type: none"> ■ Appending items ■ Inserting items ■ Removing items ■ Sorting
7	<ul style="list-style-type: none"> ● Arrays, Lists, and Maps Part 2 <ul style="list-style-type: none"> ○ Separating Strings into lists ○ Nesting arrays, lists, and maps
8	<ul style="list-style-type: none"> ● Conditional Statements Part 1 <ul style="list-style-type: none"> ○ How If / Else If / Else Statements work ○ Comparison Operators <ul style="list-style-type: none"> ■ Greater than ■ Less than ■ Equal to ■ Not equal to ■ Greater or equal than ■ Less than or equal than
9	<ul style="list-style-type: none"> ● Conditional Statements Part 2 <ul style="list-style-type: none"> ○ Logical Operators <ul style="list-style-type: none"> ■ And ■ Or ■ Not ○ Booleans <ul style="list-style-type: none"> ■ Definition

	<ul style="list-style-type: none"> ■ Implementation <ul style="list-style-type: none"> ○ Switch Case Statements ■ Implementation
10	<ul style="list-style-type: none"> ● Methods Part 1 <ul style="list-style-type: none"> ○ What is a method? <ul style="list-style-type: none"> ■ Arguments ■ Parameters ■ Signature ○ Understanding the scope of variables <ul style="list-style-type: none"> ■ Global variables ■ Local variables ■ Nonlocal variables ○ Defining a method <ul style="list-style-type: none"> ■ Adding parameters to a method
11	<ul style="list-style-type: none"> ● Methods Part 2 <ul style="list-style-type: none"> ○ Returning an output <ul style="list-style-type: none"> ■ Implementing this output in the remainder of the program ○ Calling/using a method ○ Using import <ul style="list-style-type: none"> ■ Sample packages ■ Creating and using modules
12	<ul style="list-style-type: none"> ● Methods Part 3 <ul style="list-style-type: none"> ○ Understanding and implementing recursion <ul style="list-style-type: none"> ■ Base case ■ Termination conditions ○ Constructors
13	<ul style="list-style-type: none"> ● Classes Part 1 <ul style="list-style-type: none"> ○ Understanding object oriented programming ○ Creating classes

	<ul style="list-style-type: none"> ■ Constructors ■ Objects <ul style="list-style-type: none"> ● Attributes ● Methods ● Access modifiers <ul style="list-style-type: none"> ○ Public ○ Private ○ Protected
14	<ul style="list-style-type: none"> ● Classes Part 2 <ul style="list-style-type: none"> ○ Understanding inheritance <ul style="list-style-type: none"> ■ Child (derived) vs parent (base) classes ■ How attributes and methods are passed through the classes ■ Method overriding ○ Using super constructors
15	<ul style="list-style-type: none"> ● Classes Part 3 <ul style="list-style-type: none"> ○ Understanding encapsulation and implementing it ○ Understanding polymorphism and implementing it ○ Understanding multiple inheritance, multilevel inheritance, and method resolution order ○ Using operator overloading
16	<ul style="list-style-type: none"> ● Final Review ● Object Oriented Project

Advanced

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2	<ul style="list-style-type: none">• Primitive Data Types<ul style="list-style-type: none">○ Declaration of integers, floats, and booleans○ Understanding the difference between integers, floats, and booleans○ Arithmetic Operators<ul style="list-style-type: none">■ Addition■ Subtraction■ Multiplication■ Division (including integer division)■ Exponents○ Modulo
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13	<ul style="list-style-type: none"> ● Inheritance and Recursion Part 2 <ul style="list-style-type: none"> ○ Using import <ul style="list-style-type: none"> ■ Working with external Java packages

	<ul style="list-style-type: none"> ■ Creating your own Java packages to efficiently structure code ● Learn about interfaces and how they are used <ul style="list-style-type: none"> ○ Compare to an abstract class ● Understand when to use an interface vs class
14	<ul style="list-style-type: none"> ● File Handling <ul style="list-style-type: none"> ○ Work with packages to read, write, and delete files ○ Understand the applications of file handling as a local database ○ Project: school grading system
15	<ul style="list-style-type: none"> ● Asynchronous Threading <ul style="list-style-type: none"> ○ Understand the difference between synchronous and asynchronous programming ○ Know when to use threads and for what purpose ○ Practice using threads for API calls
16	<ul style="list-style-type: none"> ● Final review and project