



## Introduction to Programming: Java

### Course Description:

Introduction to Programming: Java introduces students to computer science concepts and basic programming techniques. In this course, the students learn:

- The fundamentals of computer programming in Java
- The broader field of computer science and algorithmic thinking
- The fundamental approach that computer scientists take to solving problems.

Students will develop creative solutions for various types of problems as their understanding of the computing environment grows. In this course, we will also introduce the Java Programming Language to the students as their chosen technology in solving simple to intermediate coding problems.

Part 1: 5 credit hours | Part 2: 5 credit hours

### Course Outline

### Next Generation Science Standards (NGSS)

### Nevada Academic Content Standards for Computer Science and Integrated Technology

## Intro to Programming: Java, Part 1

### Unit 1: Program Design

- 1.1 The Importance of Programming
- 1.2 Types of Programming Languages
- 1.3 What is Java?
- 1.4 How Java Code is Processed by the Computer
- 1.5 Etiquettes in Programming

### In this unit students will learn:

The importance of programming and the role that it plays in our everyday lives.

The success stories of individuals who made a significant change in our society by being a coder. The different classification of programming languages.

About the Java programming language and how it works.

Etiquette and good coding habits one should learn. How to setup the Java Development Kit (JDK) and an Integrated Development Environment (IDE) to start coding.

**[NGSS: HS-ETS1-1]**

**[Nevada: 9-12.CS.D.1, 9-12.IC.C.1, 9-12.EL.A.1, 9-12.EL.C.1]**

### Unit 2: Number Systems and Logic

- 2.1 The Decimal, Binary and Hexadecimal Number System
- 2.2 Introduction to Binary

### In this unit students will learn:

The importance of the different types of Number System in the Computer Systems.

The common types of Number Systems: Binary,

- 2.3 The Hexadecimal Number System
- 2.4 Introduction to Octal
- 2.5 Number System Conversion
- 2.6 Signed and Unsigned Numbers
- 2.7 Process Flow Charts
- 2.8 Order of Operation

Decimal, Octal and Hexadecimal.  
 Number System Conversion: from one number system to another.  
 The importance of 'signed' and 'unsigned' numerical values.  
 How to create and use a process flow chart in graphically depicting a programming logic.  
 The order of operations to solve complex numeric equation that involves several operations.

[NGSS: HS-ETS1-2]

[Nevada: 9-12.CS.D.1, 9-12.AP.A.1, 9-12.DA.S.1]

### Unit 3: Basic Java Syntax

- 3.1 Setting the Java Development Kit (JDK), Eclipse IDE and The HelloWorld Program
- 3.2 Introduction to jshell
- 3.3 Java Program Structure
- 3.4 Keywords and Identifiers
- 3.5 Variables
- 3.6 Data Types - Primitive Type and Reference Type
- 3.7 Strings
- 3.8 Methods in Java
- 3.9 Passing Simple Parameters in Java Methods
- 3.10 Commenting - Single-line, Multi-line and JavaDoc

#### In this unit students will learn:

The fundamentals of coding and the basic Java syntax.  
 How to create their very first Java Program: the "Hello World" Program.  
 The concept of Methods and how to implement them.  
 The habit of adding Comments in your code.

[NGSS: HS-ETS1-2]

[Nevada: 9-12.AP.V.1, 9-12.AP.C.1, 9-12.AP.M.1, 9-12.CS.T.1, 9-12.AP.M.3]

### Unit 4: Operators

- 4.1 Casting Operator
- 4.2 Arithmetic Operators
- 4.3 Relational Operators
- 4.4 Logical and Short Circuit Operators
- 4.5 Assignment and Short Hand Operators
- 4.6 Ternary Operator

#### In this unit students will learn:

How to change the data type of a primitive variable using casting operators.  
 How to implement the Mathematical operators in Java that is composed of Unary operators and the Arithmetic Operators.  
 The use of logical and relational operators for condition checking.  
 The use of short-circuit, ternary, assignment and the shot-hand operators for solving programming problems.

[NGSS: HS-ETS1-2]

[Nevada: 9-12.AP.V.1]

### Unit 5: Control Structures

- 5.1 Control Flow Statements - If, If-else, if-else-if and Nested If statements
- 5.2 The switch-case Statement

#### In this unit students will learn:

The concepts of flow control structures in Java.  
 The different kinds of control flow statements and how to implement them.

5.3 The Concept Behind Control Loops  
5.4 The While Loop  
5.5 The do-while Loop  
5.6 For Loop  
5.7 The Break Statement  
5.8 The Continue Statement  
5.9 Labeled Breaks and Labeled Continue Statements

How to apply logical thinking by adding versatility to your program.

How to give decision-making abilities to your program.

**[NGSS: HS-ETS1-2]**

**[Nevada: 9-12.AP.A.1, 9-12.AP.C.1, 9-12.AP.A.3]**

## Course Outline

## Next Generation Science Standards

### Nevada Academic Content Standards for Computer Science and Integrated Technology

## Intro to Programming: Java, Part 2

### Unit 1: Arrays

- 1.1 Single Dimensional Arrays
- 1.2 The Command Line Arguments
- 1.3 Two Dimensional Arrays
- 1.4 Non-Rectangular, Two Dimensional Arrays

#### In this unit students will learn:

What arrays are.  
How to declare, create and initialize an array object.  
How to get the array limits.  
How to copy the elements of an array object to another array using the System.arraycopy() method.  
How to use the command line arguments.  
How to declare, create and use an array of arrays (two dimensional arrays).  
The difference between a rectangular and non-rectangular two dimensional array.

[NGSS: HS-ETS1-2]

[Nevada: 9-12.AP.V.1, 9-12.CT.A.1]

### Unit 2: Error and Exceptions in Java

- 2.1 Overview on Java Programming Errors
- 2.2 Debugging your Java Source Code
- 2.3 The Error and Exception Objects
- 2.4 Creating and Declaring Exceptions
- 2.5 Assertion Checks (The assert keyword)

#### In this unit students will learn:

About common programming errors, like compile time (AKA Syntax Errors), logical and runtime errors. These errors are normally encountered during the creation of a Java Program. Students will learn how to handle and debug errors using an IDE.  
About the Error and the Exception Objects and some of their sub types as well as how to handle them.  
The use of the assert keyword that is commonly used for testing.

[NGSS: HS-ETS1-2]

[Nevada: 9-12.CS.T.1]

### Unit 3: Classes and Objects

- 3.1 Introduction to Object-Oriented Programming Concepts in Java
- 3.2 Classes & Objects
- 3.3 Constructors and the Garbage Collector
- 3.4 Encapsulation and Access Modifiers in Java
- 3.5 Inheritance
- 3.6 Overriding Methods
- 3.7 Inheritance and Constructors (Constructor Chaining)
- 3.8 Polymorphism

#### In this unit students will learn:

About Java's Object Oriented Programming Concepts like Abstraction, Encapsulation, Inheritance and Polymorphism.

[NGSS: HS-ETS1-2]

[Nevada: 9-12.CS.D.1, 9-12.AP.M.1, 9-12.AP.M.2, 9-12.CS.D.1, 9-12.AP.M.3]

- 3.9 The Static Keyword
- 3.10 The toString(), equals() and hashCode() methods of the Object Class

#### Unit 4: Object Oriented Programming (OOP) Concepts and Input/Output Statements

- 4.1 Wrapper Classes
- 4.2 The Enum Keyword
- 4.3 The Final Keyword
- 4.4 The Abstract Keyword
- 4.5 Interfaces
- 4.6 How to Accept Inputs from the Keyboard Using GUI Components
- 4.7 The BufferedReader and InputStreamReader Classes
- 4.8 The Scanner Class
- 4.9 File I/O

#### Unit 5: Creating your Java Technology GUI Application

- 5.1 Introduction to the AWT Framework
- 5.2 Event Handling Techniques
- 5.3 Packaging your Java Desktop App to a JAR File

#### **In this unit students will learn:**

The basic to intermediate concepts of Object Oriented Programming and the essential keywords that you need to know to implement them.

**[NGSS: HS-ETS1-2]**

**[Nevada: 9-12.CS.D.1, 9-12.AP.M.2, 9-12.AP.PD.1, 9-12.CS.HS.1, 9-12.DA.IM.1]**

#### **In this unit students will learn:**

The principles of GUI Programming.

How to use the different containers, components and Layout Managers in creating your GUI Application.

How to provide the event handling techniques that will provide functionality on your UI components.

**[NGSS: HS-ETS1-2, HS-ETS1-4]**

**[Nevada: 9-12.AP.M.2, 9-12.AP.PD.1, 9-12.CS.D.1, 9-12.CS.HS.1]**