

**Java Programming  
Curriculum Guide  
Vineland High School South  
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## **Description of Course/Overview:**

This curriculum is designed to give learners a well-developed understanding of Java Programming. This course will cover the fundamentals of Java Programming in an accelerated manner. The course will teach students the basic skills and knowledge necessary to be able to write, compile, and run basic Java applications. Students will learn the language fundamentals, such as syntax, data types, and operators, as well as how to create expressions and statements, apply flow control, and create and call functions. This curriculum introduces the skills needed to be able to begin to use Java's larger class and object features. Students will learn how to create, use, and extend classes, as well as how to populate those classes with members and functions. They will also learn how to instantiate objects, incorporate error handling, and perform simple I/O. Upon successful completion of the course the student will be prepared for the Advanced Placement 'A' Test.

**Content Standards and Proficiencies Relative to the New Jersey Core Curriculum Content Standards:**

## 8.1 Computers and Information Literacy

## A. Basic Computer Tools and Skills

- Keyboarding
- Internet Usage
- Database Concepts and Usage

## B. Application of Productivity Tools

- Social Aspects
- Information Access and Research
- Problem Solving

## 8.2 Technology Education (Engineering and Technological Design)

## A. Nature and Impact of Technology

## B. Design Process and Impact Assessment

## C. Systems in the Design World

**Content Standards and Proficiencies Relative to College Board Requirements:**

Students should be able to:

- Design and implement computer-based solutions to problems in a variety of application areas.
- Use and implement well-known algorithms and data structures.
- Develop and select appropriate algorithms and data structures to solve problems.
- Code fluently in an object-oriented paradigm using the programming language Java. Students are expected to use standard Java library classes from the AP Java subset.
- Read and understand a large program consisting of several classes and interacting objects. Students should be able to read and understand a description of the design and development process leading to such a program.
- Identify the major hardware and software components of a computer system, their relationship to one another, and the roles of these components within the system.
- Recognize the ethical and social implications of computer use.

## Course Content:

- I. Programming Constructs
  - a. Methodology
    1. Read and understand a problem description, purpose, and goals.
    2. Top-Down Program/Problem Solving.
    3. Object-Oriented vs. Linear Programming.
  - b. Entering, Compiling and Executing
    1. "Hello Word" Program
  - c. Primitive types vs. Objects
  - d. Declarations
    1. Constant Declarations
    2. Variable Declarations
    3. Class Declarations
    4. Interface Declarations
    5. Method Declarations
    6. Parameter Declarations
  - e. Console Output/Input
  - f. Error Handling
    1. Categorizing Errors
    2. Debugging
      - i. Trace code
      - ii. Additional output statements
- II. Data Handling
  - a. Storing Data
    1. Representations of numbers in different bases
    2. Limitations of finite representations - imprecision
  - b. Arithmetic Operators
    1. Boundary Cases
  - c. Comparison Operators
  - d. Precedence
  - e. Formulas
- III. Flow and Control Statements
  - a. The 'while' and 'do...while' statements
  - b. The 'for' statement
  - c. The 'if' statement
  - d. The 'switch' statement
- IV. Advanced Data Handling
  - a. Dynamic Arrays
  - b. Array Lists
  - c. Vectors
  - d. Classes
    1. Testing Classes and Libraries in Isolation.

- V. Applets, HTML and GUI's
  - a. Basic Java Applet
  - b. HTML Basics
  - c. Graphics and Painting
  - d. Mouse Events
  - e. Keyboard Events
  
- VI. Standard Algorithms
  - a. Manipulating Data
    - 1. Traversals
    - 2. Insertions
    - 3. Deletions
  - b. Search Engines
    - 1. Sequential
    - 2. Binary
  - c. Sort Engines
    - 1. Selection
    - 2. Insertion
    - 3. Merge
    - 4. Bubble
  
- VII. AP Case Study Review
  - a. Marine Biology Case Study

**Activities:**

1. Students will complete a programming project appropriate to each section of the course content guide.
2. Students will write at least one 3 page report on a historical or contemporary computer develop to better understand the social and ethical consequences of computer technology.
3. Students will maintain a notebook for test preparation with an emphasis on computer terminology and general notes for specific algorithms.
4. Students will complete sample tests and case studies provided by the College Board for preparation for the AP test.

**Resources:**

Shelly/Cashman/Starks, Java Programming: Complete Concepts and Techniques, Boston: Course Technology, a division of Thomson Learning, 2001.

David J. Eck, Introduction to Programming Using Java Version 4.0, Web address: <http://math.hws.edu/javanotes/>, GNU Free Documentation License, 2002.

Java 2 Standard Edition Software Development Kit Version 1.4.0, Web address: <http://java.sun.com/>, Sun-Microsystems, 2002.

Computer lab with Pentium II or higher Computer Systems & Printer.

(Course maybe modified as necessary given students access to computers, College Board recommends a minimum of 3 hours per week for each student exclusive of instructional time)

**Assessment:**

Student proficiencies in each of the content areas listed in this guide shall be determined by attainment of the 70% district passing standard for purposes of course completion. It is recommended that students exceed the district standard for best preparation for College Board AP Testing. Such proficiencies shall be measured by a multiplicity of evaluation techniques, including but not restricted to:

1. Quizzes
2. Tests
3. Programming Projects
4. Notebooks
5. Homework
6. Class work
7. Student Participation
8. Oral Presentations
9. Written Reports
10. Student Generated Projects and Solutions.