STRANDS AND STANDARDS
AP COMPUTER SCIENCE

Course Description
AP Computer Science A emphasizes object-oriented programming methodology with an emphasis on problem solving and algorithm development and is meant to be the equivalent of a first-semester course in computer science. It also includes the study of data structures and abstraction.
### Intended Grade Level
10-12

### Units of Credit
1.0

### Core Code
35.02.00.00.041

### Concurrent Enrollment Core Code
N/A

### Prerequisite
Secondary Math 2, Computer Programming 1, CS Principles, Computer Programming 2, or Teacher Approval

### Skill Certification Test Number
AP Computer Science

### Test Weight
0.5

### License Type
CTE and/or Secondary Education 6-12

### Required Endorsement(s)
Endorsement 1 - Computer Science – Level 2

### STRAND 1

#### Students will use Object-Oriented Program Design

#### Standard 1
Program and Class Design
- Problem analysis
- Data abstraction and encapsulation
- Class specifications, interface specifications, relationships ("is-a," "has-a"), and extension using inheritance
- Code reuse
- Data representation and algorithms
- Functional decomposition

### STRAND 2

#### Students will use Program Implementation

#### Standard 1
Implementation techniques
- Top-down
- Bottom-up
- Object-oriented
- Encapsulation and information hiding
- Procedural abstraction
Standard 2
Programming constructs
• Primitive types vs. reference types
• Declaration • Constants
• Variables
• Methods and parameters
• Classes
• Interfaces
• Text output using System.out.print and System.out.printing
• Control • Method call
• Sequential execution
• Conditional execution
• Iteration
• Recursion
• Expression evaluation
• Numeric expressions
• String expressions
• Boolean expressions, short-circuit evaluation, De Morgan’s law

Standard 3
Java library classes and interfaces included in the AP Java Subset

STRAND 3
Students will use Program Analysis.

Standard 1
Testing
• Development of appropriate test cases, including boundary cases
• Unit testing
• Integration testing

Standard 2
Debugging
• Error categories: compile-time, run-time, logic
• Error identification and correction
• Techniques such as using a debugger, adding extra output statements, or hand-tracing code.
Standard 3
Runtime exceptions

Standard 4
Program correctness
  • Pre- and post-conditions
  • Assertions

Standard 5
Algorithm Analysis
  • Statement execution counts
  • Informal running time comparison

Standard 6
Numerical representations of integers
  • Representations of non-negative integers in different bases
  • Implications of finite integer bounds

STRAND 4
Students will use Standard Data Structures

Standard 1
Primitive data types (int, boolean, double)

Standard 2
Strings

Standard 3
Classes

Standard 4
Lists

Standard 5
Arrays (1-dimensional and 2-dimensional)

STRAND 5
Students will use Standard Operations and Algorithms

Standard 1
Operations on data structures
  • Traversals
  • Insertions
  • Deletions
Standard 2
Searching
  • Sequential
  • Binary

STRAND 6
Students will use Computing in Context

Standard 1
System reliability

Standard 2
Privacy

Standard 3
Legal issues and intellectual property

Standard 4
Social and ethical ramifications of computer use

Skill Certificate Test Points by Strand

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Test #</th>
<th>Number of Test Points by Strand</th>
<th>Total Points</th>
<th>Total Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP Computer Science</td>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>