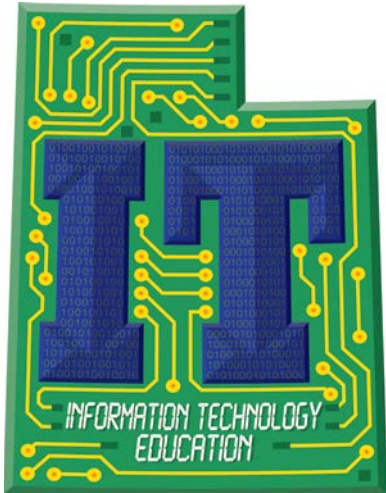# STRANDS AND STANDARDS
AP COMPUTER SCIENCE

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.

CTE Learning that works for Utah

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

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
AP Computer Science													