STRANDS AND STANDARDS

Computer Programming 1

Course Description

An introductory course in program engineering and applications. The course introduces students to the fundamentals of computer programming. Students will learn to design, code, and test their own programs while applying mathematical concepts. Teachers introduce coding concepts and problem-solving skills to beginning students through a programming language such as C++, C#, Java, Python, or JavaScript. Students will also be introduced to more complex data structures and their uses, including arrays and classes. Students will learn to create more powerful programs. (*Semester 2 – Language Specific)

CTE Learning that works for Utah

ADA Compliant: August 2019

Intended Grade Level	10-12
Units of Credit	1.0
Core Code	35.02.00.00.030
Concurrent Enrollment Core Code	35.02.00.13.030
Prerequisite	Suggested – Digital Literacy, Computer Science Principles, or Teacher Approval
Skill Certification Test Number	820, 822, 824, 826, 828, 941, 98302
Test Weight	0.5 or 1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Computer Science Level 1 or
Endorsement 2	Computer Science Level 2

STRAND 1

Students will be familiar with and use a programming language IDE (Integrated Development Environment).

Standard 1

Demonstrate concept knowledge of different languages.

- Describe the dfference between an interpreted language vs a compiled language.
- Identify characteristics of high-level and low-level languages.

Standard 2

Demonstrate the ability to use an IDE.

- Use an IDE to develop, compile, and run programs.
- Understand the difference between syntax, run-time, and logic errors.
- Use the debugger to identify errors.

Performance Skills

- Use an IDE to create a solution to solve a problem.

STRAND 2

Students will understand program development methodology.

Standard 1

Demonstrate the ability to use good programming style.

- Demonstrate proper use of white space (between lines and indentation).
- Use appropriate naming conventions for identifiers (variables, methods, functions, and file names).
- Construct identifiers with meaningful format; camelCase and underscore.

Standard 2

Understand the software development life-cycle.

- Identify specifications and understand requirements to create a solution to a problem.
- Develop a program using external documentation (flowcharts, abstracts, and pseudocode) to break down the problem into sub-components.
- Design solutions using algorithms.
- Write the code to implement the algorithm.
- Test program for verification of errors and proper functionality.
- Provide internal comments in the IDE that explain functionality through documentation (i.e comments, notes, program instructions)
- Redo all steps as needed.

Standard 3

Identify the components of a programming language syntax.

- Understand keywords, identifiers, operators, and operands.
- Understand statements and expressions in a program.
- Understand program components such as functions, methods, or procedures.

Performance Skills

- Demonstrate knowledge of program development methodology through a project.

STRAND 3

Students will demonstrate effective use of commands and operations.

Standard 1

Employ basic use of elements and data types of a programming language.

- Declare, initialize, and assign values to constants and variables.
- Demonstrate the ability to use input and output commands.
- Declare and use variable types (primitives, reference, or object).
- Identify proper data types for a specified application (boolean, integer, floating point, strings).

Standard 2

Employ basic arithmetic expressions.

- Use basic arithmetic operators (modulus, multiplication, division, addition, subtraction).
- Understand order of operation of expressions.
- Write expressions that mix floating-point and integer expressions.

Performance Skills

- Demonstrate effective use of basic commands and operations.

STRAND 4

Students will properly employ control and loop structures.

Standard 1

Demonstrate the ability to use relational and logical operators in programs.

- Compare values using relational operators (<, >, ==, >=, <=, etc.)
- Form complex expressions using logical operators.

Standard 2

Demonstrate the ability to use decisions in programs.

- Employ simple IF structures.
- Use IF-ELSE and nested IF-ELSE structures.

Standard 3

Demonstrate the ability to use loops in programs.

- Demonstrate knowledge between for-loops, while-loops, and do-while loops.
- Describe the various ways that loops can end (i.e., sentinel, break, condition fail, etc.).
- Design loops so they iterate the correct number of times (i.e., off by one errors, infinite loops, etc.).
- Utilize nested loops.

Performance Skills

- Properly employ control and loop structures.

STRAND 5

Students will be aware of career opportunities in the Computer Programming/Software Engineering industry and ethical applications.

Standard 1

Investigate career opportunities, trends, and requirements related to computer programming/software engineering careers.

- Identify the members of a computer programming/software engineering team: team leader, analyst, senior developer, junior developer, and client/subject matter expert.
- Describe work performed by each member of the computer programming/software engineering team.
- Investigate trends and traits associated with computer programming/software engineering careers (creativity, technical, leadership, collaborative, problem solving, design, etc.).
- Discuss related career pathways.

Standard 2

Have an understanding of current ethical issues dealing with computer programming and information in society.

- Explain the impact software can have on society (i.e., privacy, piracy, copyright laws, ease of use, etc.).
- Explain the ethical reasons for creating reliable and robust software.
- Describe how computer-controlled automation affects a workplace and society.

Performance Skills

- Develop awareness of career opportunities in the computer programming/software engineering industry ethical applications.

STRAND 6

Students will employ arrays and strings. (Semester 2 Strands)

Standard 1

Demonstrate the ability to use arrays.

- Declare and initialize arrays.
- Perform data input to and output from arrays.
- Perform operations on arrays.
- Iterate through the structure (i.e. for-each, enhanced for, or iterators)

Standard 2

Demonstrate the ability to use strings in programs.

- Compare string values.
- Find the length of a string.
- Create and locate substrings.
- Concatenate string values.

Performance Skills

- Properly employ array and strings.

STRAND 7

Students will properly employ object-oriented programming techniques.

Standard 1

Demonstrate the ability to use existing classes.

- Instantiate objects.
- Use an object’s data members.
- Use an object’s member functions (methods).

Standard 2

Demonstrate the ability to create user-defined classes.

- Create and use data members (instance variables).
- Create constructors to initialize the data members.
- Create and use member functions (methods).

Standard 3

Demonstrate proper design principles with classes.

- Create classes that are well encapsulated (private data members).
- Properly use modifiers and accessors (getters and setters).

Performance Skills

- Properly employ object-oriented programming techniques.

STRAND 8

Students will apply programming skill as an effective member of a team demonstrating the ability to collaborate with others.

Standard 1

Demonstrate the ability to apply knowledge to a programming project.

- Formalize specifications.
- Choose proper input parameters.
- Choose relevant data structures and processing.
- Design relevant output.
- Use relevant test data.
- Provide detailed documentation

Standard 2

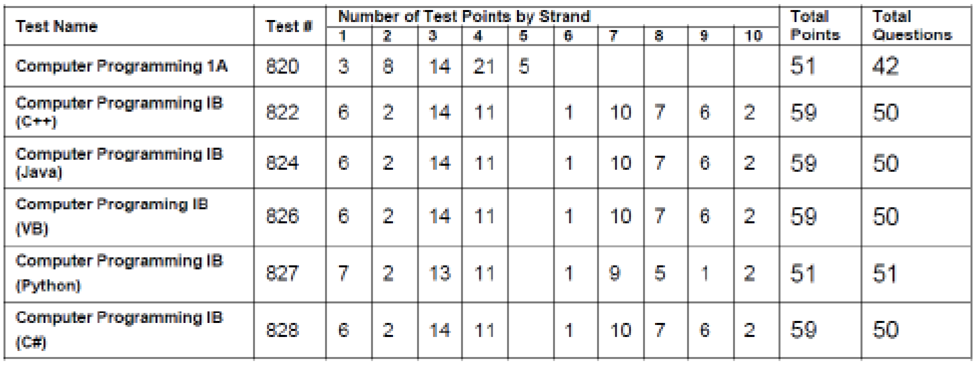
Demonstrate the ability to use teamwork and collaboration in a programming project.

- Divide a project among programmers.
- Coordinate work with others in the group.
- Complete assigned work according to predetermined deadlines.
- Participate in a peer performance evaluation.
- Demonstrate professionalism in team relationships, communication, timeliness, and attitude.

Performance Skills

- Apply appropriate programming skills as an effective member of a team.

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		
Computer Programming 1A	820	3	8	14	21	5						51	42
Computer Programming IB (C++)	822	6	2	14	11		1	10	7	6	2	59	50
Computer Programming IB (Java)	824	6	2	14	11		1	10	7	6	2	59	50
Computer Programing IB (VB)	826	6	2	14	11		1	10	7	6	2	59	50
Computer Programming IB (Python)	827	7	2	13	11		1	9	5	1	2	51	51
Computer Programming IB (C#)	828	6	2	14	11		1	10	7	6	2	59	50