Career & Technical Education

Curriculum Alignment with

Common Core ELA & Math Standards

Web Design – Computational Thinking

Course Title **110802 - Web Design - Computational Thinking** Grade Levels 9-12 Credit Value 1

Description Students analyze the structure of the worldwide web, apply basic principles of web documents and HTML, and develop multi-media web pages. Course content will include the understanding of hypertext and web structures. Equipment such as scanners, digital and video cameras, and sound recording devices will be utilized through hands-on instruction.

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title An Overview of Computers and Logic

Technical Content

Demonstrate an understanding of elementary logic, truth tables, and Boolean Algebra
Illustrate concepts using one or more programming language(s)
Describe the steps addressed in the design of a program to solve the stated problem
Describe the principles of object-oriented programming

National Standards

Students demonstrate a sound understanding of technology concepts, systems, and operations.

KY Core Academic Standards (Big Idea)

Information, Communication and Productivity - Technology
Students demonstrate a sound understanding of the nature and operations of technology systems. Students use technology to learn, to communicate, increase productivity and become competent users of technology.
Students manage and create effective oral, written and multimedia communication in a variety of forms and contexts.

Employability Skills - Vocational Studies
Employability skills will focus on student's competencies with their work habits and academic/technical skills that will impact an individual's success in school and workplace. School-to-work transition skills will help students develop interpersonal skills and positive work habits.

Communication/Technology - Vocational Studies
Special communication and technology skills are needed for success in schooling and in the workplace. Students will be able to express information and ideas using a variety of technologies in various ways.

English/Language Arts Common Core Standards

CC.9-10.L.4 Vocabulary Acquisition and Use: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

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Mathematics Common Core Standards

CC.9-12.G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

Learning Targets

Sample Learner Activities - Click in the box to go to Activities

Procedural vs. object-oriented programming

Compilers and interpreters.

Binary and hexadecimal numbers.

Documentation - internal and external.

Technical Literacy Standards

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Data Types and Variables

Technical Content

Use fundamental data types and data structures such as: integers, reals, characters, strings, Booleans, one- and two-dimensional arrays

Analyze the binary representation of data

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Mathematics Common Core Standards

CC.9-12.A.APR.6 Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Data types - integers, reals, characters, strings, booleans.	
Variables, literals, and constants.	
Variable scope.	

Technical Literacy Standards

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Program Design Tools

Technical Content

Illustrate the flow of a program

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Mathematics Common Core Standards

CC.9-12.F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

CC.9-12.F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*

CC.9-12.F.BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*

CC.9-12.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*

Learning Targets

Sample Learner Activities - Click in the box to go to Activities

Flowcharting.

Pseudocode.

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Control Structures

Technical Content

Develop algorithms with increasing degree of complexity using structured programming techniques such as: sequence, selection, and repetition.

National Standards

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Mathematics Common Core Standards

CC.9-12.A.REI.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

CC.9-12.F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$ (n is greater than or equal to 1).

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Sequence.	
Repetition.	
Selection.	

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Modularity

Technical Content

Use modular programming.

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Mathematics Common Core Standards

CC.9-12.F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Modules.	
Arguments, parameters, pass-by-value and pass-by-reference.	

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Making Decisions

Technical Content

Demonstrate an understanding of elementary logic, truth tables, and Boolean Algebra.

National Standards

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Mathematics Common Core Standards

CC.9-12.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Boolean Algebra - AND, OR, and NOT.	
Decision statements: single, multiple, and nested.	

Technical Literacy Standards

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Looping

Technical Content

Analyze the binary representation of data.

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CC.9-12.S.MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).*

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Pre- and post-test.	
Counter controlled.	
Nested.	

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Array Processing

Technical Content

Use fundamental data types and data structures such as: integers, reals, characters, strings, Booleans, one- and two-dimensional arrays

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Mathematics Common Core Standards

CC.9-12.S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).*

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
Single dimension arrays.	
Multi-dimensional arrays.	

Technical Literacy Standards

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

In grades 9-12, write arguments focused on discipline-specific content.

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Prerequisites Computer Literacy IT, HTML Web Page Development

Unit Title Files and Algorithms

Technical Content

Explain the implications of file processing.

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Students demonstrate a sound understanding of the nature and operations of technology systems. Students use technology to learn, to communicate, increase productivity and become competent users of technology. Students manage and create effective oral, written and multimedia communication in a variety of forms and contexts.

Employability Skills - Vocational Studies

Employability skills will focus on student's competencies with their work habits and academic/technical skills that will impact an individual's success in school and workplace. School-to-work transition skills will help students develop interpersonal skills and positive work habits.

Communication/Technology - Vocational Studies

Special communication and technology skills are needed for success in schooling and in the workplace. Students will be able to express information and ideas using a variety of technologies in various ways.

English/Language Arts Common Core Standards

CC.9-10.L.4.b Vocabulary Acquisition and Use: Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).

CC.9-10.L.4.a Vocabulary Acquisition and Use: Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

CC.11-12.L.4 Vocabulary Acquisition and Use: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

CC.11-12.L.4.a Vocabulary Acquisition and Use: Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

CC.9-10.SL.4 Presentation of Knowledge and Ideas: Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

CC.11-12.SL.4 Presentation of Knowledge and Ideas: Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range or formal and informal tasks.

Mathematics Common Core Standards

CC.9-12.S.CP.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").*

Learning Targets	Sample Learner Activities - Click in the box to go to Activities
File usage.	
Searching algorithms.	
Sorting algorithms.	