FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

Computer Science: Physical Computing

Board Approval Date: November 21, 2024	**Course Length: 1 Semester**
Grading: A-F	**Credits: N/A**
Proposed Grade Level(s): 6, 7, 8	**Subject Area: Elective** **Elective Area (if applicable):** **Exploratory STEAM**
Prerequisite(s): **None**	**Corequisite(s):** **None**
CTE Sector/Pathway: Information and Communication Technologies/Information Support and Services	
Intent to Pursue 'A-G' College Prep Status: No	
A-G Course Identifier:	
Graduation Requirement: No	
Course Intent: **Program (if applicable):**	

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COURSE DESCRIPTION:

The Computer Science: Physical Computing course introduces students to the concept that programming extends beyond virtual environments and into the tangible world. It encourages students to explore the imaginative use of sensors and actuators in creating systems that engage with the physical environment. Alongside formulating algorithms and applying computational thinking principles, students write and transfer programs to microcontrollers capable of executing various real-world functions. This unit aims to enhance students' grasp of computer science fundamentals by emphasizing practical implementations. This class is designed to help students prepare for, and excel in, future high school computer science courses. Furthermore, this class will integrate into the CTE Industry Sector of Information and Communication Technologies and the CTE Pathway of Information Support and Services offered in high school.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Blink!	How do you create a program?	*Debug given programs. Simulate the transfer of data in a computer *Write an algorithm	*Create a message that is displayed on a microcontroller
2. The Ins and Outs	How can programming interact with the real world?	*Describe the difference between analog and digital sensors *Use sensors to gather environment data *Use outputs to interact with the environment	*Create a model safe that uses sensors to set off an alarm when tripped and is remotely controlled by micro:bit to be activated or deactivated
3. Programming the Physical World	How can computer programs solve problems?	*Short apps identifying and correcting redundant code	*Create an interactive art display that uses lights, motion, and sound to showcase art. It must be easily accessible and interesting to a variety of people
4. Introduction to Programming	What is programming? What roles do computers play in your life?	*Check your knowledge quiz *Review	*Slideshow: Computers in everyday life
5. Intro to Micro:bit	What is physical computing? What is pseudocode and why is it used?	*Performance task: connecting and downloading to your micro:bit *Quiz on comments and pseudocode	*Fully annotate a sample app with comments *Review quiz on Intro to micro:bit
6. Functions and For Loops	What are functions and why do we use them?	*Quiz on Start Function *Review	*"Pancakes" activity on repetitive procedures

	How do we use decomposition? What's the purpose of for loops?	*Quiz on top down design	
7. If statements and While loops	What's the difference between how we use "if" and "if/else" statements? What is the purpose of a "while" loop?	*Quiz on if statements *Solve a problem called, "Is There a Ball?" *Review on conditionals	*Solve Karel "Follow the Yellow Ball Road" challenge
8. Control Structures with Micro:bit	What are some examples of logical operators? How can control structures be combined?	*Control structures example quiz *Flowchart on sample maze algorithm	*Decorate the Fence project *"Night Light" project that lights LED based on sensor values
9. What is CTE?	What are the industry sectors and pathways in CTE? What careers are of interest and match my aptitudes? Why is it important to plan for high school, college and a future career? What skills and behaviors do employers expect?	*Research outlines and flow charts *Research the Career Technical Student Organization (*CTSO*) SkillsUSA and identify middle school offerings and competitions	*Career exploration research project to identify areas of interest, aptitudes, skills and education requirements using online resources (i.e., California Career Zone and CalCRN)
10. California's Career Technical Education - Industry Sector Standard	What is the Information and Communications Technologies industry sector? What is the sub-pathway - *Information Support and Services* about? What career opportunities are there locally and globally?	*Research outlines and flow charts *Research local and global job markets and college opportunities.	*Deeper dive into a project about a career and skill sets needed for a particular area of the *Information Support and Services* career pathway.

ESSENTIAL STANDARDS:

California Computer Science Standards:
6-8.AP.10 - Use flowcharts and/or pseudocode to design and illustrate algorithms that solve complex problems.
6-8.AP.11 - Create clearly named variables that store data, and perform operations on their contents.
6-8.AP.12 - Design and iteratively develop programs that combine control structures and use compound conditions.
6-8.AP.13 - Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
6-8.AP.14 - Create procedures with parameters to organize code and make it easier to reuse.
6-8.AP.17 - Systematically test and refine programs using a range of test cases.

6-8.AP.18 - Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.
6-8.AP.19 - Document programs in order to make them easier to use, read, test, and debug.
6-8.CS.1 - Design modifications to computing devices in order to improve the ways users interact with the devices.
6-8.CS.2 - Design a project that combines hardware and software components to collect and exchange data.
6-8.DA.8 - Collect data using computational tools and transform the data to make it more useful.

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):
Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.
https://www.cde.ca.gov/be/st/ss/documents/finalelaccssstandards.pdf
https://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf

Link to Framework (if applicable):
Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.
https://www.cde.ca.gov/be/st/ss/documents/finalelaccssstandards.pdf
https://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf

Link to Subject Area Content Standards (if applicable):
Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.
Standards for Mathematical Practice

Link to Program Content Area Standards (if applicable):
Program Content Area Standards apply to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

Link to Career Readiness Practice -Pages 18-19
Career Technical Education Model Curriculum Standards

Link to California Industry Sector Standards - Pages 8-10
Information and Communications Technologies https://www.cde.ca.gov/ci/ct/sf/documents/infocomtech.pdf

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
		N/A				