

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



ELECTRONICS AND ROBOTICS

Board Approval Date: June 20, 2019	Course Length: 2 Semesters
Grading: A-F	Credits: 5 Credits per Semester
Proposed Grade Level(s): 10, 11	Subject Area: Elective Elective Area (if applicable): Career Technical Education
Prerequisite(s): N/A	Corequisite(s): N/A
CTE Sector/Pathway: Manufacturing and Product Development, Product Innovation and Design	
Intent to Pursue 'A-G' College Prep Status: Yes	
A-G Course Identifier: (g) Elective	
Graduation Requirement: No	
Course Intent: District Course Program (if applicable): CTE	

COURSE DESCRIPTION:

This course is an introduction to electronics, input sensors (buttons, switches), output actuators (LEDs, motors) and robotics. Students will be introduced to electricity and electronics safety. They will solder simple kits and later use these skills in robotics projects. Students will use simple programming to bring their projects to life. Students will use robotics to develop creative solutions to real world problems. Students are encouraged to create 3D printed or laser cut components to produce a unique robot or embellish an existing robot kit.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Basic Electronics	What is the relationship between current, voltage and resistance (Ohm's law)? How can a water analogy and a mathematical formula be used to explain Ohm's law? What are the basic schematic symbols and how are these used to write and read basic circuit schematics? What are the basic electronic components and how are they identified? How do solderless breadboards work? How do you solder to develop basic circuits? How can a digital multimeter be used to troubleshoot a circuit?	*Quizzes. *Worksheets. *Breadboard checks. *Soldering practice checks. *Think/Pair/Share.	*Circuit box: Develop a basic circuit with a unique laser cut enclosure.
2. Basics Sensors and Actuators	How do you convert binary to decimal and vice versa? Why do computers use binary? What is the difference between input components and output actuators? What is the syntax required for the current programming language? How can you use a flowchart to plan a computer program? What code and wiring is required for each component? How do you use basic logic	*Practice code and wiring for each component. *Practice flowcharting.	*Interactive Art: Create an interactive art piece with inputs and outputs.

	to make your robot react and interact with users?		
3. Working with Motors	What is the difference in functionality between servo motors, stepper motors and DC motors? What code is required for the different types of motors? How do you center a motor? What code and wiring is required for navigation sensors such as ultrasonic range finder sensors, IR line following sensors and whisker sensors?	*Follow the path activity to practice the IR line following sensor. * Clear the table activity for the ultrasonic range finder.	*Sumobot: Students will build a 3D model of a robot body and accessories, and “battle in an in-class Sumobot competition.”
4. Managing Higher Power	How do LCD screens, LED light strips and neopixels work and how are they coded and wired? How is power managed for devices requiring more than the 5V provided by the computer USB?	*Practice with LCD screens - create your own game LED light strip and neo pixel practice and check off.	*Electronic Message: Create a message with LCD screens, LED light strips or neopixels.

ESSENTIAL STANDARDS:

CTE Product Innovation and Design Pathway Standards: Essential standards addressed:

D2.0 - Understand the basic product design and development process as it relates to the design of a product, line of products, system design, or services.

D3.0 - Understand and apply various ideation techniques to develop ideas and concepts.

D4.0 - Apply various two-dimensional (2-D) graphic and/or three-dimensional (3-D) modeling techniques to development concept.

D5.0 - Develop the concept into a well-defined product for prototyping.

D6.0 - Produce a prototype of a product.

D7.0 - Evaluate the prototype to determine if it meets the requirements and objectives.

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/finaelaccsstandards.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.

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.

<https://www.cde.ca.gov/ci/ct/sf/documents/manproddev.pdf>

Link to Program Content Area Standards (if applicable):

Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

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

Other Resource Materials

Teacher recommended resource materials

Supplemental Materials

Board approved supplemental materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, software programs (Pebble Creek, DBQ, etc.)

The Folsom Cordova Unified School District prohibits discrimination, intimidation, harassment (including sexual harassment) or bullying based on a person's actual or perceived ancestry, color, disability, race or ethnicity, religion, gender, gender identity or gender expression, immigration status, national origin, sex, sexual orientation, or association with a person or group with one or more of these actual or perceived characteristics.

For concerns/questions or complaints, contact the Title IX Coordinator(s) and Equity Compliance Officer(s): Curtis Wilson, cmwilson@fcusd.org (grades K-5) and Jim Huber, ED. D., jhuber@fcusd.org 4 (grades 6-12), 1965 Birkmont Drive, Rancho Cordova, CA 96742, 916-294-9000 ext.104625