

# FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



## Advanced Robotics

<b>Board Approval Date: January 18, 2024</b>	<b>Course Length: 1 Semester</b>
<b>Grading: A-F</b>	<b>Credits: N/A</b>
<b>Proposed Grade Level(s): 7, 8</b>	<b>Subject Area: Elective Elective Area (if applicable): Science</b>
<b>Prerequisite(s): Robotics</b>	<b>Corequisite(s):</b>
<b>CTE Sector/Pathway:</b>	
<b>Intent to Pursue 'A-G' College Prep Status: No</b>	
<b>A-G Course Identifier:</b>	
<b>Graduation Requirement: No</b>	
<b>Course Intent: Program (if applicable):</b>	
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## COURSE DESCRIPTION:

The Advanced Robotics course will build upon the Robotics course and allow students to delve into the realm of robotics and automation, simulating the role of interns. Working collaboratively, they design prototypes tailored to fulfill client requirements. They construct and evaluate mechanical setups, subsequently automating them using programmed input and output mechanisms.

## DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
<b>1. Programming Robots</b>	How can you create programs that include sequences, events, loops, and conditionals? How would you decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process?	*Vex Code VR Level 1 Activities: Test bed build using motos and sensors.	*Coding existing designed robots to complete pre-determined tasks
<b>2. Solving Problems</b>	What are the steps of the engineering design process? How do you utilize these steps to provide solutions for clients' needs?	*Vex Code V5 Utilized Engineering Design Process via Sketchbook: Appropriately addressing criteria and constraints	*Coding custom-built robots to complete various individualized tasks
<b>3. Automated Systems</b>	How do design solutions using automated mechanical systems and the programming necessary for communication between the sensors, motors, and building components solve select problems that highlight students' creativity?	*Build automated robotic systems.	*Automated Assembly /Processing Line
<b>4. Control Systems</b>	How do control systems using mechanical systems and the programming necessary for communication between the sensors, motors, and building components solve select problems?	*Build and code a remotely controlled robotic system.	*Robotics Championship Competition

	What are the practical implications of user-control vs. automation?		
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**ESSENTIAL STANDARDS:**

Middle School NGSS Science Standards

MS-PS2-2. Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.

Middle School NGSS Engineering Design Standards

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impact on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they met the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

CA CSS Math

6RP

1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

6NS

1. Interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

California Standards for Mathematical Practice

- 1) Make sense of problems and persevere in solving them.
- 3) Construct viable arguments and critique the reasoning of others
- 5) Use appropriate tools strategically
- 6) Attend to precision

**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/finalelaccsstandards.pdf>

<https://www.cde.ca.gov/be/st/ss/documents/ccsmathstandardaug2013.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.

Engineering and Architecture Pathway Standards C2.0 Acquire and accurately use Engineering and Architecture sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats. C3.0 Understand the sketching process used in concept development. C5.0 Use proper projection techniques to develop orthographic drawings. C7.0 Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Engineering and Architecture sector workplace environment and community settings. (Direct alignment with SLS 9-10, 11-12.1) C8.0 Understand and apply proper dimensioning standards to drawings. California Computer Science Standards 6-8.CS.3 Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems. 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.15 Seek and incorporate feedback from team members and users to refine a solution that meets user needs.

**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**

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

**Other Resource Materials**

Vex V5, Vex VR, Vex EXP, Durable and consumable supplies, Engineering/Design Notebooks and equipment as needed.

**Supplemental Materials**

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

N/A