Robotics I
Overview
2024 - 2025

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. This document supports families in understanding the learning goals for the course and how students will demonstrate what they know and are able to do. The overview offers suggestions or possibilities to reinforce learning at home.

Included at the end of this document, you will find:

- A glossary of curriculum components
- The content area instructional model
- Parent resources for this content area

To advance to a particular grading period, click on a link below.

Priority and Important Standards

The standards describe ways in which students are expected to engage in the content. The standards weave the other knowledge and skills together so that students may be successful problem solvers and use knowledge learned efficiently and effectively in daily life.

Technology Applications TEKS Strands

There are 5 strands in which Technology Applications TEKS can be categorized in. Depending on the concept, students will engage with TEKS within the following strands:

- Computational Thinking
- Creativity and Innovation
- Data Literacy, Management and Representation
- Digital Citizenship
- Practical Technology Concepts

Grading Period 1

Unit 1: Computational Thinking and Coding

Estimated Date Range: 8/8 - 10/9

Estimated Time Frame: 42 days

Unit Overview: In this unit, students will learn about computational thinking and how it relates to coding, robotics, and engineering. They will explore, read, analyze, and write programs using a coding language. Students will be exposed to various coding languages and develop an interactive coding program as a final product for the unit.

At home connections:

- Discuss ways that tasks are completed, such as making dinner, driving to work, or anything that requires steps and planning to accomplish a task.

- Point out items that require coding of some type. For example, the remote control for a TV or intersection lights or the applications on a cell phone, they all use coding in some way.
- As a student is playing or watching someone play a video game, have them pause and break down the various coding requirements for that section of the game. Ask questions such: What parts needed coding? Where there any iterations (or repeated steps) in that part of the games? Which part of the game do they think took the most coding?
- The Scratch program that we utilize for teaching Coding allows students to create multiple projects beyond what they create for class. Encourage them to explore the other games that are in the gallery and to use the "inside" feature of the game to look at the coding that was used.

Concepts within Unit #1 **Link to TEKS**	**Success Criteria for this concept**
Concept 1: What is Computational Thinking ?	• Students will explain how computational thinking is used in everyday life and how it applies to coding.
Concept 2: Characteristics of Block and Text Based Coding	• Students will explain coding using online examples. Students begin to program code using block-based and text-based coding. • Students will create a program that incorporates movement, backgrounds, and other advanced coding features.
Concept 3: Innovations in Coding and Programming	• Students will research a career that uses computational thinking, or coding, as part of the skill set. • Students will create a product to explain a career that utilizes coding and the skills needed for that career.

Grading Period 2

Unit 2: Engineering

Estimated Date Range: 10/16 – 12/20

Estimated Time Frame: 41 days

Unit Overview: In this unit, students will learn about the Engineering Design Process (EDP) as they research, brainstorm, and apply creative and innovative design ideas. Within this unit student will apply EDP to rocket engineering. As students learn about flight, they will utilize a rocket flight simulator to design and test a model with the goal to generate a successful rocket launch. The students will demonstrate a thorough understanding of the technology concepts, systems, and operations as they encounter several problems that require problem solving and decisions while navigating a rocket simulator. Students will need to analyze rocket design specs in order to tweak and maximize the launch and performance of their product. Students will build a working prototype of their rockets based on the simulator design specs.

At home connections:

- Hobby stores have several low-cost rocket kits that can be purchased and assembled to build upon the learning from class. Though the kits come with the design, students can apply their learning to the fins and weight of the rocket to help maintain their interest in the concept.
- Encourage students to visit the NASA website and learn about the various mission that are currently active and careers that are related that go beyond just what we see on TV or during a launch.

Concepts within Unit # 2 **Link to TEKS**	**Success Criteria for this concept**
Concept 1: What is Engineering?	• Students will explain the engineering design process and how the steps relate to computational thinking
Concept 2: Application of Aerospace Engineering	• Students will explain how the engineering design process helps with the design and building of rockets. • Students will identify various careers related to engineering and the skills necessary for that field of study.

Grading Period 3

Unit 3: Innovation in Action

Estimated Date Range: 1/9 – 3/7
Estimated Time Frame: 38 days

Unit Overview: Students will delve into several other fields of engineering as they explore and solve challenges related to electrical and mechanical engineering. Through practice with training modules and lessons students will learn to apply these skills into larger challenges and projects that build upon the learning of the engineering design process while also fostering communication and creativity.

At home connections:

- Encourage students to look beyond the "outside" of devices they have in their home. Challenge them to think about the engineering that goes into items such as their video game console, microwave, or even something as simple as a water faucet. All of these items incorporate some form of engineering. Thinking about them from a new perspective helps with the computational thinking that goes with engineering.
- If possible, when throwing away old electronics, allow the students to disassemble it instead and see how the different components are put together. Be sure to stress to only take apart things that they know are being disposed of and to check with a parent or guardian first, just to be sure.

Concepts within Unit # 3 Link to TEKS	Success Criteria for this concept
Concept 1: Application of Electrical Engineering	• Students will identify the fundamental knowledge and skills for electrical and mechanical engineering, explain similarities and differences, and career fields for each. • Students will complete mini challenges that teach the fundamentals of electrical and mechanical engineering. • Students will create a solution to the challenge using the various skills and components of electrical and mechanical engineering.
Concept 2 : Application of Mechanical Engineering	• Students will be able to apply knowledge of mechanical engineering to design, program, and test a product that can be used in exploration.
Concept 3: Design and Innovation	• Students will be able to apply knowledge from the Engineering Design Process to invent, create, design and innovate a product or prototype that can be used in exploration of solving a problem.

Grading Period 4

Unit 4: Robotics

Estimated Date Range: 3/17 – 5/29

Estimated Time Frame: 47 days

Unit Overview: Students will explore robotics from the angle of different components and skills that are used to make a robot or machine work. From learning about various components and skills such as sensors and iterations, students will build various robotic products to complete challenges that test their computational thinking and creativity.

At home connections:

- Have students consider the mechanical and robotic components that go into many of our devices and breakdown how they use many skills related to engineering to complete a task.
- There are many low-cost robotic kits that all students to build simple robots that complete one task. From these students can combine kits and creativity to solve problems.
- Building blocks such as Lego or Tinker Toys can allow students to build rudimentary robots that allow students to problems solve everyday solutions for common tasks.

Concepts within Unit # 4 **Link to TEKS**	**Success Criteria for this concept**
Concept 1: Exploration of Robotics	• Students will identify the different parts of a robot and their purpose for completing tasks. • Students will complete mini challenges that teach the fundamentals of programing a robot. • Students will analyze a challenge to create a program a robot that best utilizes the various skills and components of the robot.

Glossary of Curriculum Components

Overview– The content in this document provides an overview of the pacing and concepts covered in a subject for the year.

TEKS – Texas Essential Knowledge and Skills (TEKS) are the state standards for what students should know and be able to do.

Unit Overview – The unit overview provides a brief description of the concepts covered in each unit.

Concept – A subtopic of the main topic of the unit.

Success Criteria—a description of what it looks like to be successful in this concept.

Competency—Standards-Based Grading communicates students' understanding of the Texas Essentials Knowledge and Skills (TEKS). Using the TEKS, teachers developed grade-level competencies to communicate student progress in the Standards-Based gradebook. The competencies are the same for each grade-level content area (i.e. 1st grade math) across the district. Teachers report students' progress on the competencies using learning progressions.

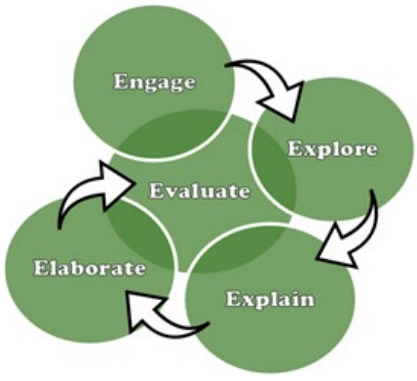
Parent Resources

The following resources provide parents with ideas to support students' understanding. For sites that are password protected, your child will receive log-in information through their campus.

Resource	How it supports parent and students
Discovery Education	This online resource provides access to a wide variety of videos to help in learning more about engineering concepts. .
Britannica School	This is an information resource for students. It has encyclopedia articles, multimedia, primary sources, games, and other learning resources that support student learning.
Ebsco Host	This online reference system serves all content areas.
Maps 101	This online resource provides access to access to maps, animations, videos, games, & activities that may be used when looking at engineering careers and where they are most prevalent.
World Book	World Book contains thousands of informational articles with stunning illustrations, videos, interactive maps, and activities.
Scratch	This is a website created by MIT that is used to teach block coding concepts.

Instructional Model:

The Instructional Model for Robotics and Engineering I is the 5E Model. The 5E model lesson cycle consists of engage, explore, explain, elaborate and evaluate. In Robotics and Engineering I, students utilize multiple class periods to navigate through this cycle.



Engineering Design Process:

In addition, Robotics I uses the Engineering Design Process. Students will engage with this model as it helps engage throughout the problem-solving practice. The steps that are used in the Engineering Design Process are: Ask, Imagine, Plan, Create, Test, Improve and Share.