



STEM Education Works®

Scope & Sequence

Robotics - Foundations of Engineering, Technology, and Robotics



FOUNDATIONS OF ENGINEERING, TECHNOLOGY, AND ROBOTICS

	Grade Band	Unit	Overview
FOUNDATIONS OF ENGINEERING, TECHNOLOGY, AND ROBOTICS	9-12	Unit 1 Lesson 1: What Is a Robot?	Students learn about robots and how they interact with the world around them.
	9-12	Unit 1 Lesson 2: Inputs, Outputs, and Processes	Students learn Systems Thinking, a problem-solving approach that simplifies the understanding of complex systems by breaking them down into components and subsystems.
	9-12	Unit 1 Lesson 3: Flowcharts and Nonlinear Processes	Students enhance their Systems Thinking skills by learning how to model nonlinear systems. Nonlinear systems, unlike linear ones, cannot be represented by a simple numbered list. Instead, flowcharts that use symbols, colors, text, and shapes are used to represent them.
	9-12	Unit 2 Lesson 1: Introduction to Block Coding	Students have their first experience programming a Dobot using block coding, a visual and intuitive form of programming that deemphasizes complex syntax. This type of programming is ideal for introducing students to Computational Thinking and the world of computer programming.
	9-12	Unit 2 Lesson 2: Variables and Lists	Students learn about the significance of variables and lists in computer programming. These elements allow for storing and updating qualitative and quantitative values, which can add depth, complexity, and simplicity to a program.
	9-12	Unit 2 Lesson 3: Dynamic Programming: Logic, Loops, and Functions	Students learn about the importance of logic, loops, and functions in computer programming. These concepts can transform a simple, linear program into a dynamic one that can effectively solve complex problems and complete complicated tasks.
	9-12	Unit 3 Lesson 1: Introduction to Text-Based Coding	Students have their initial exposure to text-based coding for programming a Dobot. They begin by exploring how computers employ binary to process data and execute tasks, then move on to controlling the Dobot's movements and actions through Python commands.
	9-12	Unit 3 Lesson 2: Inputs, Outputs, Variables, and Lists in Python	Students learn about variables and lists in Python and their role in input and output. They use variables and lists to store and update values in their programs.
	9-12	Unit 3 Lesson 3: Dynamic Programming in Python	Students learn about logic, loops, and functions in text-based coding to create dynamic programs for complex problem-solving.



NGSS Standards Alignment	NGSS Discipline	Connected Subjects	Time Required
HS-ETS1-2	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-2	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	3 hours
HS-ETS1-1 HS-ETS1-2 HS-ETS1-4	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	3 hours
HS-ETS1-1 HS-ETS1-2 HS-ETS1-4	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-2	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-2	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-1 HS-ETS1-3	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-2 HS-ETS1-4	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-2	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	3 hours



	Grade Band	Unit	Overview
FOUNDATIONS OF ENGINEERING, TECHNOLOGY, AND ROBOTICS	9-12	Unit 4 Lesson 1: Efficient Production	Students learn about the evolution of manufacturing and how current manufacturing techniques have vastly improved the efficiency of designing, creating, and delivering products to customers.
	9-12	Unit 4 Lesson 2: Intelligent Production and Quality Control	Students learn the importance of intelligent production in advanced manufacturing. Students create a responsive Python program and a conveyor belt system that implements quality control via sensors.
	9-12	Unit 4 Lesson 3: Effective Organization	Students learn the importance of effective organization in advanced manufacturing. Students create a Python program and a conveyor belt system that efficiently and effectively sorts blocks according to their color.
	9-12	Unit 5 Lesson 1: Robots Saving Lives	Students learn how robots are used to help people in disaster situations. They create a program that simulates a search-and-rescue scenario.
	9-12	Unit 5 Lesson 2: Robots and Ethics	Students explore the connection between robotics and ethics. They learn how to apply ethical principles when designing and programming robots to create an ATM.
	9-12	Unit 5 Lesson 3: The Engineering Design Process	Design impacts our surroundings significantly, from buildings to electronic devices, and the Engineering Design Process is a systematic problem-solving approach that engineers use to create effective designs.



NGSS Standards Alignment	NGSS Discipline	Connected Subjects	Time Required
HS-ETS1-1	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-1 HS-ETS1-2	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-2 HS-ETS1-3	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ESS3-4 HS-ETS1-1 HS-ETS1-2 HS-ETS1-4	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ESS3-4 HS-ETS1-1 HS-ETS1-2 HS-ETS1-4	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	4 hours
HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4	Engineering, technology, and applications of science	ELA, science, math, social studies, SEL	7 hours



