mBot Curriculum Sample Packet

Curriculum Overview

An Integrative CS/STEAM lab course for Science, Technology, Engineering, Math, Computer Science, ELA, and Arts programs.

Grades: 5-8
Ages: 10-14
Level: Introductory
For Product: MakeBlock mBot Robot
Number of Lessons: 14
Length of Lessons: 55 min to 2 hours (with 15 to 20 minute activities)
Course Length: 18 to 24 Days of 55 min each

Looking for STEM solutions that offer an engaging, integrated curriculum that blends engineering design with learning theory? Can you develop and show students how to think critically? Our mBot experience will take you there.

This is a robust CS/STEM lab course for covering CS-K12 and NGSS engineering design standards. Scaffolding is used for complex topics of coding and engineering throughout. Science, Math, and ELA are applied to problem solving.

What Hands-on Activities Are Included?
Students model self-driving vehicles with mBot and learn to control it with Scratch code. Through challenges, they explore how automated vehicles work by using mBot sensors for light levels, finding lane lines, detecting streetlights, parallel parking, avoiding objects, and using adaptive cruise control. They compete in races and a package delivery challenge.

Self-driving vehicles will be commonplace when many of the current students graduate from high school. Students use a fun robot to learn the foundations of this new technology and the science and engineering behind it. This course explores coding, physical science and engineering design using a robot to model a self-driving vehicle. Students are engaged in problem-based learning and critical thinking as they learn how to control their robot and complete challenges with block-based coding.

Hands-on activities guide students to learn how automated vehicles work by using sensors for light levels, finding lane lines, parallel parking, and avoiding objects like adaptive cruise control. Each lesson ends with an open-ended challenge activity where students apply new concepts to solve a real-world problem. Fun in-class competitions allow students to demonstrate skills with a maze race and a challenge to deliver the most packages.

Student Group sizes can vary from 1 to 4 students. We recommend teams of 2. Student team roles are defined in one of the Overview Getting Started lessons. Being able to work on a team is a critical skill for 21st Century careers. By encouraging good communication and social-emotional habits, you are helping students learn these skills.

The coding lessons follow the NGSS Engineering Process: Ask, Imagine, Plan, Create, and Improve. This engineering process provides a cornerstone for critical thinking and problem solving. By teaching students to use this process, you are helping them to develop habits that will lead to these critical 21st century skills. Another essential part of this process is to allow students to struggle and fail, and to be ok with this. The best learning occurs when we learn from our mistakes. This is based on educational research on how people learn, and how engineers think and problem-solve.

As an Integrative STEAM course, the lessons include the application of math, NGSS science, arts and ELA embedded in technology and engineering. These concepts are included:

● Foundations of engineering design, critical thinking, force and motion, time-distance-speed, Newton's laws, energy, light and sound waves, and waves for information transfer are some of the many Science concepts covered in the lessons.

● Students use math tools to measure and weigh, convert measurements, calculate, record data in charts, and create graphs. They use math formulas to make the robot move in a straight line, at angles, in geometric patterns, arcs, and circles.

● Computer Science concepts include sequences, commands, program flow, sensor data, decision making, math formulas, loops, variables, functions, lists, arrays, random numbers, algorithms, pseudocode, flow charts, and troubleshooting.

● Engineering and computer science STEM careers are highlighted, and real-world examples of STEM applications are provided throughout.