

# Robotics Curriculum: Course Descriptions

## TREC: Technology, Robotics, Engineering and Coding

- 10 courses that progress through higher levels of complexity
- Courses available starting with 2nd grade (7 year olds) through high school

### **TREC 1: Sense, Plan, Act •**

In this introductory course, students learn about their robotics kits and how to use them. They also learn about the many computer- and robotics-based devices they use every day, and how robots use sensors and programmed plans to take effective actions.

### **TREC 2: Creative Engineering**

Students follow Socket to his work at an animal sanctuary in the savannah. Students learn additional building skills, how to develop creative solutions by applying the basic engineering process, and how robots have impacted medicine. Activities include writing, math applications, and even cross-cultural investigations.

### **TREC 3: Mobility and Sequence •**

Students start with a survey of simple machines. They then build and program robots to complete basic dead-reckoning navigation tasks. Age-appropriate handling of robot-drive geometry and distance-rate problems, and physical drive design constraints round out the engineering experiences and challenges.

### **TREC 4: Sensing and Logic**

Students review basic movements and further develop their mathematical reasoning by playing two digital games that deepen their proportional reasoning and other mathematical skills. Students then learn how to program their robots' sensors. Additionally, students investigate every-day applications of sensors and survey the ways in which STEM impacts daily life.

### **TREC 5: Experiments and Analysis**

Students build and program robots in applications focused on responsive real-time autonomy through repeated decisions (looped conditionals), variable tracking, and data logging.

### **TREC On-Ramp: On-Ramp •**

Students learn or review the fundamental programming concepts covered in previous levels of the TREC curriculum. This allows middle and high schools to 'on-ramp' students who are transferring in from schools that did not offer robotics training.

### **TREC 6: Engineering Explorations**

Students will be introduced to the engineering design process' principles as they use their previous knowledge of programming and robotic design to solve real-world problems within a series of projects and challenges.

### **TREC 7: Data and the World**

Students undertake engineering projects that require them to model the physical world using data abstraction.

### **TREC 8: Algorithmic Thinking**

Students undertake programming and engineering projects that require their robots to manipulate data abstractions of substantial complexity.

### **TREC 9: Collaborative Engineering**

Using the Engineering Process, students will complete second-level engineering challenges requiring them to apply all programming, engineering, and design knowledge learned to develop effective designs.

### **TREC 10: Internet of Things**

This capstone level course is designed to bring the concepts of industrial design, electronics, programming, and connectivity together in a course focused around developing automated solutions to everyday problems.



• Indicates an entry-point course

For use with VEX IQ and LEGO EV3 hardware platforms

Courses subject to change

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