

Curriculum Map: Project Lead The Way Automation & Robotics (PLTW AR)

Department: Technology & Engineering

Grades: 7 Credits:

Course Overview/Description

Project Lead the Way (PLTW) is a 9 week encore class offered to all 7th grade students that provides a comprehensive approach to STEM Education. Through activity-, project-, and problem-based curriculum, PLTW gives students a chance to apply what they know, identify problems, find unique solutions, and lead their own learning.

Students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects.

Scope and Sequence

Timeframe	Unit	Instructional Topics
Week 1	AR7-1 What is Engineering?	<ul style="list-style-type: none">• Engineering Careers
Week 2	AR7-5 The Design Process	<ul style="list-style-type: none">• Steps in the Design Process• Applying the Design Process
Week 3	AR7-2 Automation & Robotics	<ul style="list-style-type: none">• Algorithm VEX Build• Exploring Robots
Weeks 4, 5, 6	AR7-3 Mechanical Systems	<ul style="list-style-type: none">• Observing mechanisms• Mechanical Gears• Pull Toy Challenge
Weeks 7, 8, 9	AR7-4 Automated Systems	<ul style="list-style-type: none">• Robot Behaviors & Pseudocode• Using RobotC with Testbed• Automation through Programming Project

Course Standards:

Please refer to the [PLTW Gateway Standards Connection](#) document to view all course standards.

UNIT 1: What is Engineering? 5 days

Description: Students investigate the question, “What do engineers do?” and how engineers could invent or innovate a product to help enhance their lives. Students research different types of engineering careers and share their findings.

Standards:

- 1) AR7-1: I can investigate a career related to automation & robotics and determine the requirements for entering the field.

- 2) MSP LAB 4: I can evaluate competing design solutions to determine how well they meet the criteria and constraints of the problem.

INSTRUCTIONAL TOPIC: Engineering Career Research

Description: Students will complete at least one of six different career-related exploration activities in myPLTW.org.

Learning Targets

- Students investigate what engineers do and how they solve problems
- Students research an engineering career and share their findings on job description, requirements, education, salary, etc.

UNIT 2: The Design Process 5 days

Description: A design process is used to create a solution or solve a problem. A design process has many forms, but is essentially a structured way to create a solution, and it reduces the danger and inefficiency of a simple trial-and-error approach. In this lesson, students will use a design process and associated tools similar to an engineer to create a solution and solve a problem.

Standards:

- 1) AR7-1: I can investigate a career related to automation & robotics and determine the requirements for entering the field.
- 2) MSP LAB 4: I can evaluate competing design solutions to determine how well they meet the criteria and constraints of the problem.

INSTRUCTIONAL TOPIC: Design Process Steps -- 2 Days

Description: Students will discuss the PLTW Design Process presentation, take notes in Activity B.1, view an episode of PBS Design Squad video, and complete Activity B.2 Design Elements.

Learning Targets

- Describe the design process and how it is used to aid in problem solving.
- Describe the elements of design.
- Recognize design criteria and constraints.
- Describe the purpose and importance of working in a team.

INSTRUCTIONAL TOPIC: Applying the Design Process -- 3 Days

Description: Students will discuss the Design Brief presentation. With a partner, students will create a design brief in Project B.3 Furniture Design that includes a decision making matrix and design sketch.

Learning Targets

- Use the design process to solve a technical problem.
- Apply the elements of design to the design process.
- Explain a design brief and apply the concept when using the design process.
- Operate effectively as a member of a team to complete a design project.
- Use a decision matrix to select the best solution to a design.

UNIT 3: Automation & Robotics 5 days

Description: These activities are to demonstrate how communication, both written and verbal, are essential in teamwork and in communicating with technology. The field of automation and robotics includes computer-controlled machines used to make manufacturing more efficient, productive, and safe. Robots are also used as assistive tools for people with disabilities and as equipment in hospitals to help with surgery, to deliver food, or to dispense medications. Robots are becoming popular household helpers, performing chores like vacuuming and mowing lawns. Scientists say that future generation robots will be able to clean up, take out the trash, or even care for an elderly parent. In this unit students will learn how automation and robotics affect everyday life both positively and negatively, including safety, comfort, choices, and attitudes about a technology's development and use.

Standards:

- 1) AR7-1: I can investigate a career related to automation & robotics and determine the requirements for entering the field.
- 2) MSP LAB 4: I can evaluate competing design solutions to determine how well they meet the criteria and constraints of the problem.

INSTRUCTIONAL TOPIC: Algorithm VEX Build -- 2 Days

Description: Students

Learning Targets:

UNIT 4: Mechanical Systems 15 days

Description:

INSTRUCTIONAL TOPIC: __ -- __ Days

Standard:

Learning Targets

UNIT 5: Automated Systems 15 days

Description:

INSTRUCTIONAL TOPIC: __ -- __ Days

Standard:

Learning Targets: