

9 Week Engineering Focus Scope and Sequence

This Scope and Sequence is intended to be a starting point for VEX EXP educators looking to start with a set 9-week scope of STEM Lab Units and Activities. This scope will explain how you can use these curricular materials while focusing on engineering topics. It is organized by week, so you can print out one page and reference it throughout the week to see what activities your students should be completing.

A column for the VEX EXP Educator Certification is also listed to show how you can complete portions of the certification while teaching VEX EXP to your students. In this scope and sequence, you will complete Units 1, 2, 6, 7, and 8.

All STEM Lab Units and Activities referenced in this scope and sequence will be linked. For more information about implementing EXP STEM Lab Units or using VEX EXP activities in your classroom, see these articles:

- [Implementing STEM Lab Units with VEX EXP](#)
- [Using VEX EXP Activities in the Classroom](#)

As you implement these curricular resources, it is important to understand how your students will be working together. [See this article for more information about how you can support student collaboration.](#)

Week 1 - Introduction

Weekly Summary: Students will be introduced to the VEX EXP Kit and learn how pieces are used together to create different shapes. This builds their spatial reasoning skills before moving into their first engineering challenge.

VEX EXP Educator Certification: Complete [Unit 1: Getting Ready](#) and [Unit 8: Teaching with VEX EXP](#) before class.

STEM Lab Units / Activities	Description
Scavenger Hunt Activity	Use the Interactive Parts Poster to learn more about the VEX EXP Kit and find all the pieces described.
Tallest Tower Challenge Activity	Students are challenged to build a taller freestanding tower than their partner using the same 10 pieces.
Hang Out Activity	VEX EXP beams and plates make up the structure of most builds. Students are challenged to build a device that hangs out the largest distance off of their desk.

Differentiation:

- For students who need additional support getting started building, have them complete the [Advanced Scavenger Hunt](#).
- For students who need additional challenges in building, have them complete the 'LEVEL UP' section within each Activity.

Week 2 - Robot Soccer Introduction

Weekly Summary: Students will explore how to use the Controller to drive their Clawbot to grab, pass, and score the most points in a Robot Soccer competition.

VEX EXP Educator Certification: Complete [Unit 2: Controller](#) before class.

STEM Lab Units / Activities	Description
Robot Soccer Lesson 1: Introduction	Students will build the VEX EXP Clawbot and ensure the Controller and Battery is charged.
Driver Configurations Activity	Students will test their robot driving skills with four different driving configurations. Note that this activity shows a BaseBot, but can be completed with the Clawbot that students are building.

Differentiation:

- For students who finish early with the build, encourage them to practice their driving skills with the [BaseBot Driver activity](#). Note that this activity shows a BaseBot, but can be completed with the Clawbot that students are building.

Week 3 - Robot Soccer Lesson 2

Weekly Summary: Students will learn about passive and active manipulators as well as intake designs before competing in a one-on-one Robot Soccer challenge.

VEX EXP Educator Certification: Complete [Unit 7: Hardware Construction Techniques](#) before class.

STEM Lab Units / Activities	Description
Robot Soccer Lesson 2: Manipulators	Students will learn about passive and active manipulators as well as intake designs before competing in a one-on-one Robot Soccer challenge.

Differentiation:

- Have students who say they are 'done' time themselves and come up with a plan to remove all Buckyballs from the Field within one minute in the [Manipulators in Motion Practice activity](#).

Week 4 - Robot Soccer Lessons 3 and 4

Weekly Summary: Students will compete in the Robot Soccer Competition, then reflect on their learning experience and related STEM careers.

VEX EXP Educator Certification: Complete [Unit 6: Troubleshooting](#) before class.

STEM Lab Units / Activities	Description
Robot Soccer Lesson 3: Competition	Students will plan for the final Robot Soccer Competition and compete!
Robot Soccer Lesson 4: Conclusion	Students will reflect on their learning with the debrief conversation and connect the Unit to related STEM Careers.

Differentiation:

- Have students complete multiple choice board options for their chosen career in the Conclusion lesson to extend the Unit.
 - [Career Choice Board](#)

Week 5 - Up and Over Introduction

Weekly Summary: Students will explore claw designs to move a ring on the Field, and then be introduced to the Up and Over Competition.

STEM Lab Units / Activities	Description
Up and Over Lesson 1: Introduction	Students will build the VEX EXP Clawbot and ensure the Controller and Battery is charged.
Navigate the Maze with Driver Control	Students will practice their driving skills as they navigate through a maze using driver control. Note that the activity shows a BaseBot, but can be completed with the Clawbot students build.

Differentiation:

- Have students design mazes in their engineering notebooks and share them with other groups to challenge them to solve the maze and drive through in the [Navigate the Maze with Driver Control Activity](#).
- To extend the lessons, have groups complete the 'LEVEL UP' options within each activity.

Week 6 - Up and Over Lesson 2

Weekly Summary: Students will learn about claws and how an effective claw works before applying that to engineer a claw for the Grab and Go challenge.

STEM Lab Units / Activities	Description
Up and Over Lesson 2: Claw Design	Students will learn about claw design and scouting to design their own claw to better compete in the Grab and Go challenge activity.

Differentiation:

- Have students who say they are 'done' add an additional Buckyball to the field. How does their claw design change if they need to move multiple Buckyballs at one time?
 - [Improve Your Claw Practice Activity](#)

Week 7 - Up and Over Lesson 3

Weekly Summary: Students will learn about different elements and types of robotic arms in order to design their own robot arm and stack as many Buckyballs onto rings as possible in the Stacked Up challenge.

STEM Lab Units / Activities	Description
Up and Over Lesson 3: Arm Design	Students will learn about different elements and types of robotic arms in order to design their own robot arm. They will design their arm in their engineering notebook before creating their design using the VEX EXP Kit.

Differentiation:

- If students are looking for ways to test out their arm and claw designs after the Practice activity, have them use the [Forward, Lift, Reverse Activity](#).

Week 8 - Up and Over Lesson 4

Weekly Summary: Students will learn about motor groups and how they can be used to increase power on a robot design.

STEM Lab Units / Activities	Description
Up and Over Lesson 4: Motor Groups	Students will learn about motor groups and how they can be used to increase power on a robot design. This can be used in conjunction with the arm or claw changes on the robot. Students will also learn about strategies for choosing a driver in competitions.

Differentiation:

- To apply additional force to the arm and have greater lifting power, encourage students to begin exploring mechanical advantage through gear ratios and the [How Big are Your Teeth](#) Activity.

Week 9 - Up and Over Lessons 5 and 6

Weekly Summary: Students will compete in the Up and Over Competition, then reflect on their learning experience and related STEM careers.

STEM Lab Units / Activities	Description
Up and Over Lesson 5: Competition	Students will plan for the final Up and Over Competition and compete!
Up and Over Lesson 6: Conclusion	Students will reflect on their learning with the debrief conversation and connect the Unit to related STEM Careers.

Differentiation:

- Have students complete multiple choice board options for their chosen career in the Conclusion lesson to extend the Unit.
 - [Career Choice Board](#)