

Robotics Engineering Curriculum (REC)

Robotics Engineering Curriculum (REC) for VEX V5 provides a comprehensive study program of engineering concepts through relevant activities and projects using the VEX V5 Robotics hardware and VEX® Coding Studio (VCS) robotic programming software.

Curriculum Mapped to National Standards

- ATLAS of Science Literacy
- ITEEA Standards for Technological Literacy
- NCTM Principles & Standards for School Mathematics
- Next Generation Science Standards
- GA - Foundations of Engineering Technology

Course Outlines

Year 1, Semester 1

- **Unit 1: Introduction to Robotics**
 - 1.1 (Core): Introduction to Robotics
 - 1.2 (Core): The Design Cycle
 - 1.3 (Activity): Engineering Notebook
 - 1.4 (Core): Safety
 - 1.5 (Core): The VEX Robot
 - 1.6 (Activity): Vex Components
 - 1.7 (Core): Fasteners
 - 1.8 (Activity): Chassis Construction
 - 1.9 (Core): Drive Train
 - 1.10 (Activity): Drive Train Construction
 - 1.11 (Core): Robot Controller
 - 1.12 (Activity): Wiring the Vex Controller and Battery
 - 1.13 (Core): Wireless Control
 - 1.14 (Activity): Using Wireless Control
 - 1.15 (Core): Dual Joystick Control (Tank)
 - 1.16 (Activity): Tank Control
 - 1.17 (Core): Single Joystick Control (Arcade)
 - 1.18 (Activity): Arcade Control Operation
 - 1.19 (Core): Robot Systems Design
 - 1.20 (Activity): Adding Components to the BaseBot
 - 1.21 (Project): Motion Path Challenge.

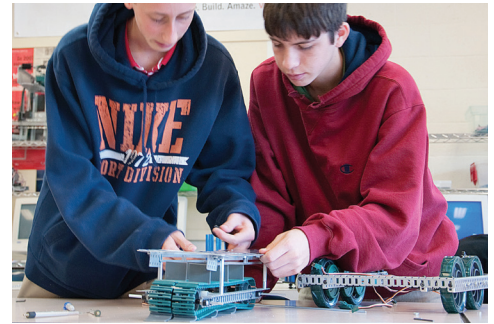
- **Unit 2: Intro to VEX Programming with VEX V5**
 - 2.1 A (Core): Basic Motor Control
 - 2.1 B (Activity) Programming Components
 - 2.2 (Activity): Draw a Line
 - 2.3 (Core): Pseudocode and Turns
 - 2.4 (Activity): Make a Square
 - 2.5 (Core): Variables, Constants and Comments
 - 2.6 (Activity): Apply Constants, Variables, and Comments
 - 2.7 (Core): Tools in VEX Coding Studio (VCS)
 - 2.8 (Activity): Using VCS Tools
 - 2.9 (Core): Dead Reckoning and User Functions
 - 2.10 (Activity): Follow a Complex Path
 - 2.11 (Core): Conditional Statements
 - 2.12 (Activity): Modifying the GoForward Function
 - 2.13 (Core): Loops
 - 2.14 (Activity): Make Multiple Squares
 - 2.15 (Core): Simplified Symbols, Logical Operators, and Integer Math
 - 2.16 (Activity): Drawing Shapes
 - 2.17 (Project): Fine Motor Control

- **Unit 3: Physics and Robotics**
 - 3.1 (Core): Motors and Motor Speed
 - 3.2 (Activity): Angular Velocity

- 3.3 (Core): DC Motors: Types and Uses
- 3.4 (Core): Gears and Gear Trains
- 3.5 (Activity): Gear Trains
- 3.6 (Core): Fundamentals of Linear Motion
- 3.7 (Activity): Linear Motion
- 3.8 (Core): Rotational Dynamics
- 3.9 (Activity): Linear and Angular Velocity
- 3.10 (Core): Newton's Laws
- 3.11 (Activity): Weight
- 3.12 (Core): Friction and Traction
- 3.13 (Activity): Coefficients of Friction
- 3.14 (Core): Torque
- 3.15 (Activity): Test Motor Torque
- 3.16 (Core): Gear Ratios and Torque
- 3.17 (Activity): Hill Climb
- 3.18 (Core): Power
- 3.19 (Project): Tractor Pull

Year 1, Semester 2

- **Unit 4: Sensors**
 - 4.1 (Core): Introduction to Sensors
 - 4.2 (Activity): Open-Loop vs. Closed-Loop Navigation
 - 4.3 (Core): Open-Loop vs. Closed-Loop Systems
 - 4.4 (Core): Introduction to Vex Kit Sensors
 - 4.5 (Activity): Bumper Car
 - 4.6 (Core): Ultrasonic Sensors
 - 4.7 (Activity): Ultrasonic Rangefinder
 - 4.8 (Activity): Warn and Avoid with Speaker
 - 4.9 (Core): Following Lines
 - 4.10 (Activity): The Line-Following Sensor
 - 4.11 (Activity): Line Following
 - 4.12 (Unit Project): Bumper Books
- **Unit 5: Arms and End Effectors**
 - 5.1 (Core): Introduction to Robotic Arms, Degrees of Freedom
 - 5.2 (Activity): Robotic Arm Construction
 - 5.3 (Core): Mass, Weight, Center of Weight & Torque
 - 5.4 (Activity): Center of Weight of BaseBot
 - 5.5 (Core): Relationship of Torque, Gear Ratio and Weight of Payload
 - 5.6 (Activity): Stall Torque
 - 5.7 (Core): Remote Control; Limit Switches
 - 5.8 (Activity): Windshield Wiper
 - 5.9 (Core): End Effectors
 - 5.10 (Activity): End Effector
- **Unit 6: REC 1 Project**
 - 6.1 (Project): Ultrasonic Trainyard Challenge



Hardware Requirements

Qty	Description	VEX Part Number
1	V5 Classroom Starter Kit	276-6500
1	Line Tracker (3-Pack)	276-2154
1	Ultrasonic Range Finder	276-2155
1	Gear Kit (Low Strength Gear Kit)	276-2169
1	4" High Traction Tire (4-Pack)	276-1489
1	Metal and Hardware Kit	276-2161
1	Wheel Kit	276-2164
1	Limit Switch (2-pack)	276-2174
1	3.00" Standoff (4-pack)	275-1020

Ordering Information

REC I - Semester 1 for use with VEX V5, Units 1-3.
REC1-CUR5-SEM1

REC I - Semester 2 for use with VEX V5, Units 4-6.
REC1-CUR5-SEM2

Contact Us: