



Robotics Olympiad 5-6 Syllabus

Course Goals

1 Understand Intermediate Programming Logic and EV3

Students learn how to program mobile robots using the EV3 programming language and how to utilize sensor feedback systems for conditional logic.

2 Develop Engineering and Problem-Solving Skills

Students apply measurement and geometry to optimize robot navigation and path planning and work in teams to develop creative solutions for challenges. They integrate what they learn about sensors, programming, and robot design to create complex robot behaviors.

3 Develop Competition Experience and Strategies

Students are challenged by the instructor and other students to refine their abilities in programming and robotic design.

Course Topics

1 Robotics Design Principles

Students understand gear ratios, stability and center of gravity, articulation and motorized limbs, and optimum sensor placement.

2 Sensors and Feedback

Students learn about tilt, color, ultrasonic, and touch sensors. They use sensor input, feedback, math, and sensor programming blocks.

3 EV3 Programming

Students learn the EV3 Programming language, custom programming blocks, control loops and datawires, Bluetooth messaging connections, programming sequences, and logic.

4 Problem Solving

Students learn how to assess a challenge, brainstorm solutions, cooperatively plan, use trial and error, and delegate team member responsibilities.

5 Geometry and Navigation

Students practice measurement and course planning, angles and turn calculation, types of turns, obstacle avoidance, and line following.

6 Competition Strategies

Students test and refine ideas through competition, challenges, and teamwork.

Course Schedule

Day 1

Class Welcome

Students are introduced to each other and the class rules. They then form groups.

Build Taskbot

Students begin to build the EV3 TaskBot once successfully grouped.

Lesson: Keeping a Design Journal

Students go over the basics of the workbook and learn how to organize their thoughts before building and programming and reflect on the concepts they learned after each activity.

Lesson: Programming Basics

Students learn two of the block tabs in the EV3 programming language and what the block types are used for.

Activity: Movement Checklist

Students go through various different exercises in the workbook for movement.

Day 2

Activity: Turns Checklist

Students complete a provided checklist and get familiar with accurate turns.

Lesson: Introduction to Sensors

Students learn about the different sensor control options available to them.

Activity: Sensor Checklist

Students complete the sensor checklist and get familiar with different options available to them

Lesson: Gear Ratios

Students learn about gear ratios and use this knowledge to modify their vehicles.

Challenge: Drag Race

Students customize their robots and the gear ratios of their robots to compete in a drag race.

Day 3

Activity: Line Following

Students combine their knowledge of the switch block and the color sensor to create a program that allows for the Taskbot to follow a complex line.

Challenge: Two Button Remote Control

Students test their knowledge of the flow control options and create a two-button remote control for the TaskBot.

Day 4

Activity: Ultrasonic Maze

Students use the ultrasonic sensor to navigate through a maze.

Challenge: Sumo

Students use their knowledge of all the sensors and basic programming knowledge and participate in a simple robotic fight.

Day 5

Challenge: Sumo

Students use their knowledge of all the sensors and basic programming knowledge and participate in a simple robotic fight.

Lesson: Data Wires

Students learn about the input and output block settings in the EV3 software.

Day 6

Activity: Data Wire Checklist

Students complete the data wire checklist and familiarize themselves with advanced programming techniques.

Challenge: Rock, Paper, Scissors

Students program a robot that can play Rock, Paper, Scissors using data wires.

Lesson: Bluetooth

Students learn about Bluetooth controls and programming.

Day 7

Challenge: Mario Kart Racing

Students race each other through a course designed by their instructors using Bluetooth connections.

Day 8

Challenge: RoboCup Soccer

Students form teams and play soccer using their robots.

Day 9

Challenge: Bluetooth Sumo

Students participate in a battle using customized robots.

Day 10

Class Wrap Up

Students review the design, programming, and scientific material they've covered in the course. Students then disassemble their robots, inventorying their kits in the process.

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