Fairfax Collegiate

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Robotics Combat 7-9 Syllabus

Course Goals

1 Advanced Programming Logic and EV3
Students learn how to program mobile robots and how to utilize sensor feedback systems for conditional logic through advanced EV3 programming options.

2 Engineering and Problem-Solving Skills
Students apply measurement and geometry to optimize robot navigation and path planning, and they 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 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 become familiar with gear ratios, stability and center of gravity, articulation and motorized limbs, optimum sensor placement, relative advantages of wheels, treads, bipedal, and tripedal designs.

2 Sensors and Feedback
Students learn how to use 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, programming sequences, and logic.

4 Problem Solving
Students assess challenges, brainstorm solutions, cooperatively plan, use trial and error, and delegate team member responsibilities.

5 Geometry and Navigation
Students participate in measurement and course planning, angles and turn calculation, types of turns, obstacle avoidance, and line following.

6 Combat and Competition
Students test each other's programming skills and knowledge through challenges and competitions.

Course Schedule

Day 1
Class Welcome

Students are introduced to the class and its rules. They form the groups they will work in over the course of the class.

Build Taskbot
Students begin to build the EV3 TaskBot once successfully grouped.

Lesson: Programming Basics
Students learn the movement block options available in EV3, as well as the switch and loop blocks.

Activity: Movement Checklist
Students go through various exercises in the workbook for movement.

Activity: Turns Checklist
Students complete provided checklists regarding their robots and get familiar with accurate turns.

Day 2
Activity: Bumping Heads
Students participate in one on one battles where they try to knock their competitors over using custom attachments to the TaskBot.

Lesson: Introduction to Sensors
Students learn about the different sensor control options available to them.

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 3

Day 4
Lesson: Gear Ratios
Students learn about gear ratios and use this knowledge to modify the TaskBot.

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

Challenge: Jousting
Students compete in a jousting duel, creating weapons and modifying the TaskBot to defeat opponents.

Day 5
Challenge: Sumo
Students customize their robots for combat.

Day 6
Lesson: Data Wires
Students learn about the input and output options in the EV3 software.

Challenge: Rock, Paper, Scissors
Students program a robot that can play Rock, Paper, Scissors.

Day 7

Lesson: Bluetooth
Students learn about Bluetooth controls and programming.

Challenge: Bluetooth Combat
Students compete in robotic combat using Bluetooth controls.

Day 8

Challenge: Sumo Rematch
Students redo the sumo challenge with their improved programming knowledge and with a robot of their own design.

Day 9

Challenge: Battle Royale
Students customize a robot to fight in a challenge that they design.

Day 10

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

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