Fairfax Collegiate

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EV3 with Java 7-9 Syllabus

Course Goals

1 Learn Programming Principles with Java
Students learn the basic principles of object oriented programming. They practice these principles using the Java programming language to solve a variety of challenges.

2 Practice Interactive Programming
Students learn to develop programs that go beyond the computer and into the real world. They program their robots to act in the real world based on tactile and sensor input.

Course Topics

1 Java Programming Syntax
Students learn the basic syntax rules of the Java programming language. They create simple programs to calculate math problems and write messages.

2 Variables
Students use variables to store and modify data in their programs.

3 The leJOS API
Students use the leJOS API to connect to the different parts of their EV3 robot and write programs to control it.

4 Control Flow
Students use conditionals and loops to alter the flow of their program, allowing them to make their robots autonomously interact with their environment.

5 Robotics Engineering and Applications
Students build several different robot designs, designed to move and act in very different environments. They learn about different ways robots are used around the world.

6 Object Oriented Programming Design
Students learn about how to organize their code into classes and methods in an object oriented programming language.

Course Schedule

Day 1
Class Introduction
Students learn about the basics of the EV3 with Java class. They introduce themselves to their instructors and classmates and find a partner to work with for the class.

Robotics and the EV3
Students receive a brief overview of the field of robotics and some applications. They also learn the basics of the EV3 kit and robot.

Building the EducatorBot
Students build their first robot, the EducatorBot, which they will use to learn the basics of robot building and programming.

Day 2
Introduction to Programming
Students learn about some of the basic principles of programming.

Installing leJOS
Students learn how to install the leJOS operating system on their robots, which allows them to use the Java programming language to program their robots.

Java Programming in Eclipse
Students learn about the basic syntax of the Java programming language. They learn about the Eclipse integrated development environment and write their first Java program.

Computer Math with Variables
Students learn to use variables in Java to store data. They learn to use variables to store different types of data and perform mathematical operations with them.

Java on the EV3
Students learn how to run Java programs on the EV3. Students control their robot's movement and make a message appear on the screen.

Day 3
Movement Challenges
Students practice writing programs on the EV3 by completing a series of challenges based on controlling the EV3's movement.

If Statements and Conditions
Students use If Statements to write programs that can perform different actions depending on a set of conditions.

Repeating Actions with Loops
Students learn to use loops to repeat certain tasks in their programs.

EV3 Sensors - Touch and Sight
Students use the touch and ultrasonic sensors to let the robot interact with other objects in the world. They learn about the leJOS sensor framework and how to program the sensors using Java.

Day 4
EV3 Sensors - Color and Gyro
Students learn how to use the EV3 color sensor to allow the robot to further interact with its environment. Students also learn how to use the gyro sensor to make precise turns with their robots.

Sensor Programming Challenges
Students practice using the sensors to complete a series of programming challenges.

Challenge: Line Follow
Students program their robot to follow a line using the the programming skills they've learned so far.

Day 5
Assemble the Perpetual Walker
Students assemble the Perpetual Walker, a robot that moves by walking instead of using wheels or treads.

Programming the Walker
Students learn to program the walker to maneuver along the ground with careful movements of each of the motors.

Day 6
Review Programming Concepts
Students review the programming concepts and syntax they learned in the previous week.

Challenge: Walking the Obstacle Course
Students use their perpetual walker to navigate a small obstacle course, using the code they wrote previously and their knowledge of sensors to control the robot.

Day 7
Building the SCARA Arm
Students learn to build a SCARA robotic arm, which can pick up and move objects with precise movements.

Programming the SCARA Arm
Students program the SCARA arm to pick up small objects and move them around by using the EV3 to control the arm's movements.

Day 8
SCARA Testing and Review
Students try out the SCARA arm to pick up different objects and look at ways that they could improve the design of the arm.

Constructing the WarBird
Students build the final robot of the course, the WarBird, which moves using treads and can fire small balls with a mounted cannon.

Day 9
Patrolling with the WarBird Day 1
Students program the WarBird to navigate around an obstacle course with several small objectives. Students compete to see who can score the most points on the course.

Day 10

Finish WarBird Patrol Activity
Students finish the WarBird patrol activity from the previous day.

Robotics Cleanup
Students disassemble their robot and clean up their kits, taking an inventory of the pieces in the kits as they go.

Wrap Up and Review
Students go over the programming and robotics material they learned in the course.

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