**Robotics 20**

Course Outline

Warman High School

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**Big Idea:** Robotics 20 is an introductory course intended to give students a basic understanding of electronics, mechanics, Arduino processing, and related terminology so that they can upload simple programs (called Sketches) to operate a four-wheeled robot. Initially, students will use logical sequencing, flow charts, and schematic diagrams to develop simple code so that they can upload programs into electronic/robotic devices. The final project will require that students incorporate all learning to build, program, and operate a Robot Smart Car.

**Inquiry:** Students will receive direct instruction in areas that are a matter of precision and safety. Many of the activities allow for individual curiosity and experimentation within these standards. Students will explore uses and applications of robotics in real world settings as well as related career opportunities. Reflection about the learning process will be utilized to guide one-on-one conferences with the instructor.

**Module Outcomes:** The outcomes are not listed since there are many SK curriculum outcomes for Robotics. This course has been established from many varied options in the curriculum.  The plan focuses on using Arduino programming devices that are proving to be cutting edge in many areas, including robotics. Grades are reported by module and are available on Gradebook.

**Course Configuration and Evaluation**

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| --- | --- | --- | --- | --- |
| **Module #** | **Module Name** | **Activities / Assessment** | **Allotment (Hours)\*** | **Evaluation****(Overall %)** |
| 1 | Safety | * Understand Procedures and Safety
* Identify personal protective equipment
* Everyone is responsible for lab maintenance
 | 3 | 10% |
| 2 | Electronics Basics/ Soldering | * Know and use standard colour conventions
* Organization of components
* Construct and test a variety of series and parallel circuits
* Describe the basic function of a diode, including polarity
* Develop debugging strategy for troubleshooting
* Demonstrate ability to solder PCB components
 | 15 | 15% |
| 3 | Ethics/File Management | * Explore the historical perception of ethics re: robots
* Research proposed legislation involving use of drones
* Form an opinion about the moral implications of artificial intelligence and robotic devices
* Organize computer files using naming conventions, and be able to share via Google drive/Google docs
 | 4 | 10% |
| 4 | Careers | * Educational requirements of various career paths in robotics
* Research post-secondary programs
* Research gender equity and diversity in robotics and how to encourage under-represented groups
 | 9 | 10% |
| 5 | Car Project Construction /Mechanical Research | * Research the purpose and function of various parts associated with a robotic vehicle
* Construct the vehicle accurately and test its functionality
 | 11 | 10% |
| 6 | Coding | * Understand proper syntax for coding
* Introduce and utilize Arduino libraries
* Understand scope, conventions, and purpose of variables
* Explore the meaning and value of binary thinking in controlling devices
* Apply this learning to car movement control through coding
 | 12 | 10% |
| 7 | Sensors | * Program the robotic car to avoid obstacles/ explore uses in industry
* Program the robotic car to use the line sensor
 | 9 | 10% |
| 8 | Final Project | * Scale Drawing of Plan
* Inquiry Project – students use learning from all units to develop an interesting way to program the robot car that demonstrates learning in the course
* Self-Assessment/obstacle course performance
 | 15 | 5%(drawing)20%(working project) |
|  | Total |  | 78 | 100% |

\* Number of dedicated hours is an estimate and will be influenced by student need.

**Assessment for Learning:** Formative assessment will take the form of class discussions (electronics, mechanics, programming logic), visual representations (flow charts, schematic drawings), constructive quizzes (electronics, mechanics), constructions projects (circuits, Sketches: Arduino coding term for completed code), demonstration of understanding with physical equipment (breadboard circuits, coding a response for the robotic car, and developing original code), and peer/self-assessment.

**Assessment of Learning:** Student conferences, checklists, quizzes, rubrics, and student self-assessment results will be used to ensure consistent, accurate and meaningful representation of student progress and offer support for student learning. The final project will demonstrate the cumulative effect of learning in the course.

**Resources:**

1. [Arduino.cc](https://www.arduino.cc/) This is the official programming website that has been installed within our School Specific Software
2. <https://www.introtoarduino.com/downloads/IntroArduinoBook.pdf> This open source document provides students with information and activities to build Arduino coding skills
3. Keyes Basic Starter Kits with Arduino Uno and Breadboards are used for initial instruction in electronics, mechanics, and Arduino sketch making.
4. Arduino Upgraded Smart Robot Cars are provided to each student. They can be disassembled and used by the next group.
5. Students use online resources to research careers in robotics.

**Classroom Expectations Overview**

1. Respectful and polite conversation is the only acceptable standard.
2. ABSOLUTELY NO FOOD AND DRINK is allowed in the core of the lab during class (including eating from food in a backpack). Any visible food or drink (open or not) MUST be kept at the front of the lab on the table.
3. All students are expected to be working on only one machine that is logged in on their own name.
4. All students are expected to be working at completing Robotics assignments.
5. Students are encouraged to offer verbal assistance to a nearby peer during working time, but are not allowed to physically do any of the work for them or enter within their personal space.
6. Monitors are not to be turned or tilted. If you want to show your work to someone else, you must have them come to your monitor to view it. Do not turn the monitor towards them!
7. Hats are allowed. Hoods/earbuds/earphones cannot be worn during instruction. Otherwise, hoods are acceptable. Earbuds/earphones can only be used to listen to audio provided on the website by the teachers. This is a collaborative class so listening to music is not an option.
8. All assignments are due as indicated by the teacher. Late assignments will result in the teacher expecting the student to work in the lab after school to catch up (as arranged by student). Due dates are to be honored. Late assignments will receive a mark of zero immediately and the parent notified the next day. A student can discuss a plan for completion with the instructor. Rewrites of quizzes are not an option.
9. Personal devices cannot be used for any purpose not expressly determined by the instructor (i.e. texting, phone calls, social media, games).
10. Students are expected to adhere to digital citizenship guidelines as good stewards of the school's resources and equipment.
11. Safety practices must be observed at all times. Goggles/glasses must be worn while working with equipment or soldering.
12. It is required that students must wear a mask at all times, and they must wear the mask if within 6 feet of another person outdoors.