Robotics Year Long a-g Course Syllabus with Home

Instructor/Facilitator: Course:

Location: Contact:

Course Description:

Parallax Robotics ™ is a high school level course appropriate for 9th – 12th grade students who are interested in electronics, robotics, and programming. The Parallax Robotics ™ course is designed to build essential STEM related knowledge while building essential 21st century skills such as critical-thinking, collaboration, innovation, communication, self-management, design-thinking, and perseverance.

Parallax Robotics ™ relies heavily on students building their technical literacy by collaboratively constructing understanding of Parallax ™ technical manuals while using critical-thinking skills to design robots in innovative ways; being able to demonstrate their understanding both orally and in writing through reflection on their design and revision process.

This course will rely on resources at <http://learn.parallax.com/>, the Parallax ™ Boe-Bot, Microcontroller (WAM), and Smart Sensors in order to create a classroom culture of inquiry and applied problem-solving with opportunities to extend to real-world applications with project-based learning (PBL).

Course Objectives:

1. Create, maintain, and work in a safe laboratory environment.
2. Build, design, and program circuits and robots.
3. Have a classroom culture of collaboration, self-management, design-thinking, innovation, problem-solving, and perseverance.
4. Use reflection and revision to communicate understanding of technical writing.
5. Approach tasks and problems with a mind of inquiry and accomplishment.
6. Look for innovative ways to apply learning to real-world problems through a Project-Based Learning (PBL) approach.

Class Policies:

1. Attendance: Attendance is required in accordance with school policy.
2. Work Ethic: Be prepared to work every class, all class long.
3. Pay Attention: Though much of the class is hands-on, there will be times that the instructor will need to explain or demonstrate. Pay attention for the safety of yourself and those around you.
4. Food or drink: Not allowed. Water is a drink.
5. Electronic Devices: Use of electronic devices must be in accordance with school policy.
6. Computer Use: Computer use, including online access, must follow school policy for computer and internet use.
7. Grading: It will be your responsibility to demonstrate understanding of technical materials, application of course knowledge and skills, as well as critical-thinking, design thinking, collaboration, self-management, and innovation through inquiry, solving problems, and applying learning to real-world applications.
8. Policies and Procedures: It is required that you follow all policies and procedures at all times.

Grading:

*(This will vary from site to site. We recommend the use of grading rubrics)*

Course Topics:

* Software and hardware setup ([download Boe-Bot pdf](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf))
* Building, testing, and programming LED circuits ([download WAM pdf](https://www.parallax.com/downloads/whats-microcontroller-text))
* Building, testing, and programming Servo Motors ([Boe-Bot Ch.2](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf), [WAM Ch.4](https://www.parallax.com/downloads/whats-microcontroller-text), and [Servo on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=servo))
* Assembling the Boe-Bot robot ([Boe-Bot Ch.3](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf))
* Frequency and sound with the Piezospeaker ([Boe-Bot Ch.3](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf), [WAM Ch.8](https://www.parallax.com/downloads/whats-microcontroller-text), and [Piezo on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=piezo))
* Maneuvers, Subroutines, and EEPROM ([Boe-Bot Ch.4](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf), [WAM Ch.7](https://www.parallax.com/downloads/whats-microcontroller-text), [Maneuvers on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=maneuvers), & [EEPROM on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=eeprom))
* Digital input with pushbuttons (WAM Ch.3 and [Pushbutton on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=pushbutton))
* Making decisions from tactile input ([Boe-Bot Ch.5](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf) and [Whiskers on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=whiskers))
* Using a dial (potentiometer) to vary input ([WAM Ch.5](https://www.parallax.com/downloads/whats-microcontroller-text) and [Potentiometer on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=potentiometer))
* Navigating and measuring distance with IR ([Boe-Bot Ch. 7 & 8](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf) and [IR on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=ir))
* Ohm’s Law (Boe-Bot Ch.6, WAM Ch.7, and [Ohm’s Law on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=ohms+law))
* Measure light with phototransistor & making navigation decisions ([Boe-Bot Ch. 6](https://www.parallax.com/sites/default/files/downloads/28125-Robotics-With-The-Boe-Bot-v3.0.pdf), [WAM Ch.7](https://www.parallax.com/downloads/whats-microcontroller-text), & [Phototransistor on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=phototransistor))
* Connecting and programming the Parallax™ Serial LCD Display ([LCD on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=serial+lcd))
* Using the Parallax™ Ping))) Ultrasonic Sensor to measure distance ([Ping on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=ping))
* Using the Parallax™ Tilt Sensor to detect direction ([Tilt on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=tilt))
* Using the Parallax™ Xbee to remotely control your robot ([Xbee on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=xbee))
* Measuring tilt and rotational movement with the Parallax™ Memsic Accelerometer ([Memsic on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=memsic))
* Advanced IR sensing with the Parallax™ QTI ([QTI on Learn.Parallax.com](http://learn.parallax.com/search?search_api_views_fulltext=qti))

Standards:

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| **Common Core State Standards (ELA)** | **Common Core State Standards (Math)** | **Next Generation Science Standards (NGSS)** | **Career Technical Education Standards (CTE)** | **21st Century Competencies** |
| CCSS.ELA-LITERACY.RST.9-10.1   * Cite specific textual evidence to support analysis of science and technical texts, attending to precise details of explanations or descriptions   CCSS.ELA-LITERACY.RST.9-10.2   * Determine central ideas or conclusions of a text; trace text’s explanation or depiction of a complex process, phenomenon, or concept; provide accurate summary   CCSS.ELA-LITERACY.RST.9-10.3   * Follow precisely and complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks   CCSS.ELA-LITERACY.RST.9-10.4   * Determine meaning of symbols, key terms, and domain-specific words and phrases in scientific or technical context   CCSS.ELA-LITERACY.RST.9-10.5   * Analyze the structure of the relationships among concepts in a text, including relationships among key terms   CCSS.ELA-LITERACY.RST.9-10.6   * Analyze the author’s purpose in providing an explanation describing a procedure, or discussing an experiment in a text, defining the questions the author seeks to address   CCSS.ELA-LITERACY.RST.9-10.7   * Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words   CCSS.ELA-LITERACY.RST.9-10.8   * Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem   CCSS.ELA-LITERACY.RST.9-10.9   * Compare and contrast findings presented in a text to those from other sources (including own experiments) noting when the findings support or contradict   CCSS.ELA-LITERACY.RST.9-10.10   * Read and comprehend science/technical texts independently and proficiently |  |  | (CRP) Career Ready Practices  *2. Apply academic & technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education. They make correct insights about when to apply the use of an academic skill.*  (IT) Information Tech Career  *11. Hardware components*  *12. Software functions*  (IT-SUP) Info Support & Services  *4. Installation, configuration*  (IT-PRG) Programming/Software  *4. Software development tools*  *5. Software development process*  *6. Program CPU application*  *7. Software testing*  *8. Quality assurance*  (ST) STEM Careers  *6. Tech skills in STEM* | * Collaborative * Self-directed * Use technology |