Engineering II: Robotics - Designing, Building, and Operating

Fairfield Ludlowe High School - Fairfield Warde High School

Half Year/Semester

COURSE DESCRIPTION

This is a project-based course introducing students to the fundamental concepts of robotics through the engineering design process. Students will learn about the different components of robots, including actuators, sensors, and controllers. They will also learn about the principles of kinematics, dynamics, and control. Students will apply what they learn to design, build, and program their own robots. Students will participate in a variety of challenges to build, create, and operate robots that perform specific tasks and solve problems.

COURSE OBJECTIVES

Students will be able to:

- Identify the parts of a robot.
- Identify the purpose of a robot.
- Discuss the different types of robot control systems.
- Define the terms "autonomous" and "teleoperated" robots.
- consider the goals of a robot in the process of designing.
- identify and consider the different factors involved in designing robots, such as functionality cost, safety, and ethics.
- use CAD software to design and simulate robot mechanisms.
- safely operate robots.
- identify physical parts that are used to build robots.
- install the physical and electrical components necessary to make a robot work.
- assemble a robot.
- troubleshoot and repair robots.
- write a simple program for a robot to perform a task.
- program a robot to use information from sensors to control its physical output.
- debug and refine robot programs.
- identify uses for drones and other non-manned aircraft.
- explain some of the key applications of AI and ML in robotics.
- identify uses of AI in robotics.

UNITS OF STUDY

Unit 1 - Introduction to Robotics
Unit 2 - Robotics Design
Unit 3 - Robotics Construction

Unit 4 - Robotics Programming
Unit 5 - Advanced Robotics

COURSE POLICIES AND REQUIREMENTS

GRADING: Generally….See district policy (Policy 6146.1AR)

Grading Communication

- Specific grading expectations and practices will be communicated to all students and families at the start of the school year via a consistent format.
- If students or parents have questions about grading practices, they should follow the district's established chain of command structure (see district website) with the first contact being to the teacher and then to the school administration.
- Buildings will send out reminders of the importance of checking students' grades in the Grading Portal with directions.
- Teachers will notify guardians when students fall into the F range after October 1st.

Grade Reporting

- For a processed piece or "chunked" assignments that are part of a larger task, feedback and the grade shall be shared before the next step in the process, so long as students have submitted their work at those checkpoints, on time.
- Grades for summative assessments shall be entered within 10 school days from the date of submission or the date it was due, whichever is later.
- Grades for formative assessments shall be entered within 5 school days from the date of submission or the date it was due, whichever is later, and prior to any subsequent assessment.

Guidelines for Late Work :

- Teachers will accept late work for both summative and formative tasks beyond the due date.
- Teachers will not accept late work beyond the deadline for late work. The deadline is defined as the next class period from the due date of the assignment or the alternative date that the teacher and student may agree upon depending on individual circumstances.
- Teachers may reduce the total points students can achieve as a penalty for late work up to the deadline. Students will earn a zero (0) if the assignment is not submitted or is submitted after the deadline.
- Late work only consists of assignments with an expected due date. Assessments, such as tests, quizzes and in class assignments, must be taken on the scheduled date except in cases of make-up assessments due to an excused absence.

REASSESSMENT GUIDELINES:

Eligibility of assessments	Teachers of the same course will determine which summative assessments are eligible. Students can select any part of a project to reassess. Reassessments may not be allowed one week before the end of a term.
Process	Students have two class periods in which to indicate they would like to take a reassessment. Teachers will make clear to students their preferred method for students to request reassessment (*e.g.* email or filling out a simple form/spreadsheet).

Frequency	Students will have the opportunity to reassess on two summatives per year but not more than one per term (quarter).
Assessment Format	Based on discussion between the student and teacher, students will revise portions of the original assessment in which they did not show proficiency.
Gradebook impact	Original and reassessment scores will be averaged in the gradebook.

MATERIALS:

- As provided by the course.

EXPECTATIONS OF STUDENTS:

- Be Tech and Learning Ready: Come prepared with all necessary materials, including your charged device and any required software.
- Prioritize Safety: Follow all safety guidelines and procedures, especially when working with tools, equipment, or hazardous materials.
- Participate Actively: Engage in class discussions, ask questions, and contribute to group projects. Actively participate in lab activities by following instructions, working collaboratively, and cleaning up your workspace.
- Respect the Digital Realm: Treat all digital resources and equipment with care. Avoid actions that could harm or disrupt the learning environment.
- Embrace Digital Citizenship: Use technology ethically and responsibly. Be mindful of copyright laws and online etiquette.

EXTRA HELP:

- Students should seek out extra help when needed. The teacher is available for extra help before and after school as well as during prep periods.