

# Robotics | Syllabus

## Community High School | 2024-25

### Stuart E. Burt II

#### Course Overview

This class is meant to be an introduction to topics in Science, Technology, Engineering, and Mathematics (STEM); exploring the field of Robotics. Robotics is a true intersection of all four of those subjects, and a robot would not be complete without each of them.

During the course of the year, students will explore the different types of robots, how robots are used, how robots are designed, and how to build those same robots. A combination of lecture, group collaboration, independent study, and project management will be used in this course to reach our goals. Students will develop teamwork and communication skills, essential for real-world engineering and technology environments.

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#### Course Goals

- **Understanding Robotics Fundamentals:** Students will develop a foundational understanding of key robotics concepts, including the roles of sensors, actuators, and controllers in robotic systems.
- **Basic Programming Skills:** Students will learn and apply basic programming skills, enabling them to write simple programs that control robotic components and systems.
- **Hands-On Building and Experimentation:** Students will engage in hands-on activities to build and experiment with simple robots, fostering practical skills in assembling and troubleshooting robotic devices.
- **Problem-Solving and Critical Thinking:** Students will enhance their problem-solving and critical thinking abilities by designing, building, and programming robots to complete specific tasks..
- **Collaboration and Teamwork:** Students will work collaboratively in teams to brainstorm, plan, and execute robotics projects, developing essential teamwork and communication skills.

- **Introduction to the Engineering Design Process:** Students will gain experience with the engineering design process, including brainstorming, prototyping, testing, and iterating designs to improve functionality and performance.

### Traits of a Brave

Our classroom is built upon the traits of a Brave: **Generous, Passionate, Humble, and Wise.** **Generosity** guides us to share knowledge, support our peers, and contribute positively to our learning community. **Passion** drives our enthusiasm for discovering new concepts, exploring ideas, and striving for excellence in all our endeavors. **Humility** reminds us to be open-minded, acknowledge our mistakes, and learn from others with gratitude and respect. **Wisdom** encourages us to make thoughtful decisions, seek understanding, and apply our learning to real-world situations.

By embodying these traits, we create a dynamic and nurturing environment where everyone can grow and succeed.

- Be Generous
  - Help Others
  - Respect Others
  - Get Involved
  - Share
  - Collaborate
- Be Passionate
  - Learn More
  - Do More
  - Do it Right
  - Stay Hungry
  - Love Strong
  - Finish Strong
- Be Humble
  - Put Others First
  - Praise People
  - Share Credit
  - We Before Me
  - Accept Criticism
  - Ask For Help
- Be Wise
  - Have Common Sense
  - Listen More
  - Trust Your Gut
  - Watch Your Words
  - Know People
  - Know Your Job

## Classroom Expectations

- Be Positive
  - Maintain a positive attitude and be open to constructive feedback.
  - Encourage and support your peers.
- Be Respectful
  - Show respect to the teacher and classmates at all times.
  - Listen attentively when others are speaking and participate actively in discussions.
  - No cussing
- Be Prepared and Punctual
  - Bring all necessary materials to class
  - Complete all assigned homework on time and review class notes regularly.
  - Arrive on time and be seated before the bell rings.
- Be Engaged
  - Stay focused on the lesson and participate in class activities.
  - Ask questions if you don't understand something.

## Cell Phone and Technology Policy

- Use technology responsibly and only for academic purposes.
- Student computers are to be used only when permitted by the instructor for a particular purpose, otherwise they should be put away
- **Cell Phones are to be turned off and put away at all times**
- First Offense: Private Warning; Second Offense: Warning Referral in Skyward and Phone Call Home; Third Offense: Office Referral and Phone Call Home

## Supplies Needed

- Qty 4 - College Ruled Spiral Notebook - 70 Sheets
- Loose Leaf College Ruled Notebook Paper
- #2 Pencils

## Teaching Strategy

To effectively teach an entry-level robotics class, a balanced approach that integrates theoretical instruction with hands-on, project-based learning will be employed. This strategy ensures that students receive a comprehensive education in robotics, balancing theory with practice and individual learning with collaborative projects.

Hands-on learning will be a cornerstone of the course, with students engaging in regular lab sessions where they can apply their knowledge to real-world scenarios. These sessions will involve building simple robots and writing programs to control them, reinforcing the concepts learned in class. Projects will be designed to encourage creativity and problem-solving, with initial projects focusing on basic tasks such as moving a robot in a straight line or following a light source. As the course progresses, students will tackle more complex projects that require integrating multiple sensors and actuators, culminating in a capstone project where they design, build, and program a robot to complete a challenge.

## Evaluation and Grading

Students are evaluated through group assignments, projects, take home assignments, weekly quizzes and unit tests. Over the course of a semester, students will take unit exams and a "mock AP exam" semester exam. Exams consist of instructor written questions and multiple choice items, as well as, free response questions from past AP exams.

**Tests and quizzes** will contain a variety of questions (multiple choice, short answer, sketching) asked from differing perspectives requiring a student to express themselves in a number of ways. Tests are required to be corrected upon return to the student. Every corrected problem requires a written explanation and must also include what correct information (concept, rule, and idea) should have been used. Corrected test problems can receive a maximum of half of the original points for that particular question.

**Late Work** - Students must complete and turn in any work within two days following an absence of 1-2 days. Students get the same number of days to make up an assignment as the amount of days they missed. Any work turned in after the due date without an absence, can receive a grade no higher than a 70.

### **Grades will be determined by the following breakdown:**

40% - Formative Assessments (Homework, Classwork, Weekly Quizzes)

60% - Summative Assessments (Unit Tests, Projects)

Semester grades will be averaged 45% per 9 weeks, with 10% of a student's grade coming from the semester exam if they are not exempt.

## Technology

Throughout the course, students will use multiple approaches to the understanding of robotics. Programming languages, prototyping, 3d printing, electronic design, and virtual robots will all be used to explore the field of robotics. Student chromebooks will be used in class to accomplish some of our technology goals in addition to Raspberry Pi's, Arduinos, VEX Robotics Kits, and off the shelf sensors.

## Topics Covered

- Safety and Lab Space
- Project Management
- Artificial Intelligence
- Electronics
- Robot Parts and their purpose
- Sensors and Their Uses
- Robot Functions
- Robot Design
- Fields and Careers in Robotics

### Parent/Guardian and Student Agreement

I'm excited for this school year and cannot wait to see what our students will learn and accomplish. I hope to partner with you this year as parent/guardian partnership is proven to greatly boost academic success. My contact information is below, you will be hearing from me throughout the school year and I hope to hear from you!

Stuart E. Burt II  
[stuart.burt@communityisd.org](mailto:stuart.burt@communityisd.org)  
Community High School  
Room 109  
Extension 2109

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By signing below, you agree that you have received and reviewed this syllabus.

Student Name \_\_\_\_\_ Date \_\_\_\_\_

Student Signature \_\_\_\_\_

Parent/Guardian Name \_\_\_\_\_ Date \_\_\_\_\_

Parent/Guardian Signature \_\_\_\_\_