Welcome to Robotic Builders: Future Engineers, Semesters 1 & 2

This course is meticulously designed to align with state standards and targeted learning objectives, ensuring comprehensive coverage of essential knowledge and skills required for student success.

Course Description:
Robotic Builders: Future Engineers is an immersive high school course that takes students on a journey through the exciting world of robotics and engineering. Throughout this year-long course, students will design, build, and program robots to perform various tasks and challenges. With a focus on hands-on learning and creative problem-solving, students will work both individually and in teams to tackle real-world engineering problems and design innovative robotic solutions.

The course emphasizes the application of engineering principles, such as mechanical design, electrical systems, and programming, to build functional robots. Students will gain experience with cutting-edge technology and learn how to program their robots to carry out specific commands and tasks. Through projects and challenges, students will develop valuable skills in critical thinking, teamwork, and technical expertise, preparing them for future careers in robotics, engineering, and technology.

Course Syllabus

Semester 1: Introduction to Robotics & Engineering Foundations

Unit 1: The Basics of Robotics

- Introduction to robotics: history, types of robots, and their applications.
- Overview of basic robotic components (motors, sensors, actuators, etc.).
- Introduction to engineering principles: force, motion, and energy.

Unit 2: Building Your First Robot

- Hands-on project: assembling a simple robot.
- Understanding the structure and design of robots.
- Exploring basic mechanical engineering concepts in robot design.

Unit 3: Introduction to Programming Robots

- Basic programming concepts and languages (e.g., block-based coding, Python).
- How to control robot movements through programming.
- Implementing sensors and basic feedback loops in robotics.

Unit 4: Problem-Solving and Innovation in Robotics

- Engineering design process: identify, design, build, test, improve.
- Group challenges and problem-solving activities.
- Creativity and innovation in robotic solutions.

Semester 2: Advanced Robotics & Engineering Applications

Unit 1: Advanced Robotics Components & Systems

- Exploring advanced sensors, motors, and actuators for complex robot functions.
- Understanding feedback control systems and decision-making in robots.
- Introduction to autonomous robots and artificial intelligence in robotics.

Unit 2: Collaborative Robotics Projects

- Group project: designing and building a robot to perform a specific task or solve a problem.
- Emphasis on teamwork, communication, and collaboration.
- Developing a prototype and troubleshooting design issues.

Unit 3: Programming for Complex Tasks

- Advanced programming techniques for robot control and automation.
- Using algorithms and logic to enhance robot performance.
- Integration of sensors and inputs for autonomous functions.

Unit 4: Preparing for a Career in Engineering & Robotics

- Exploring careers in robotics and engineering.
- Understanding the role of robotics in industries like manufacturing, healthcare, and space exploration.
- Preparing a final project that showcases skills and knowledge gained throughout the course.

Learning Outcomes

By the end of this course, students will:

1. Understand the fundamental principles of robotics and engineering.
2. Be able to design, build, and program robots to perform specific tasks.
3. Apply problem-solving, critical thinking, and teamwork skills in robotics projects.
4. Gain experience with advanced robotics components and programming techniques.
5. Be prepared for careers in robotics, engineering, and related fields.

Conclusion

Robotic Builders: Future Engineers offers an exciting and hands-on approach to learning engineering and robotics. By combining creativity, innovation, and technical skills, students will build the foundation for future careers in cutting-edge fields like robotics, automation, and engineering. This course will ignite students' passion for technology and engineering, while giving them the skills needed to thrive in a rapidly evolving technological world.

Prepare to design the future of robotics—start building today!