

Robotics I – Semester 1: Introduction

Course Syllabus

Availability: Fall and Spring Grade

Level: MS-HS Prerequisites: None

Description: Robotics I, an Introduction is a one-semester course that explains various concepts related to robotics. This course begins by describing the evolution and applications of robotics. Students will explain the importance of teamwork and describe the skills needed to work in a team. Students will describe Newton’s laws of motion and their applications in robotics. Students will describe basic concepts of Boolean algebra, electricity, electronic circuits, magnetics, and their applicability to robotics. This course will also help students identify career opportunities, employability skills, and important safety skills in robotics. Finally, students will be provided an option to construct a simple robot.

This course is being designed and delivered in partnership with CDLS and the St. Vrain Valley School District Innovation Center and delivered by a team of St Vrain teachers and students. **This course will include a “kit” to support student exploration.**

Course Goals:

By the end of this course, students will:

- Describe the evolution and applications of robotics.
- Explain the importance of teamwork in the field of robotics.
- Describe Newton’s laws of motion and their applicability to robotics.
- Describe Boolean logic and construct truth tables.
- Explain the basic concepts of electricity and their application in robotics.
- Describe the use of sensors in robotics.
- Describe the use of motors and gears in the movement of robots.
- Identify career options in the field of robotics.
- Describe and apply safety procedures and practices when working with robots
- Construct a simple robot.

Unit 1: Foundations of Robotics

Summary

In this unit, students describe the key milestones in the evolution of robotics and the future of robotics, students describe the role and utility of six simple machines in robot creation. They explain the characteristics of an effective team and identify leadership qualities required to build strong relationships among team. They describe Newton’s three laws of motion.

Finally, they will explain the basic laws of Boolean algebra and construct truth tables and logical expressions.

Unit 2: Robotic Sensors and Motors

Summary

In this unit, students explain the basic concepts of electricity and their applications in robotics. They describe how magnetic fields are used for good controllability of robots and the use of magnetically actuated micro-robots. They also describe different types of sensors and distinguish between active and passive sensors. They also describe the use of gears in robotics and explain how a DC motor works. Finally, they describe the purpose and use of servos in robotics and explain how angle and torque are controlled in a servo motor.

Unit 3: Real World Aspects of Robotics

Summary

In this unit, students identify courses, certifications, and job roles available in the field of robotics and describe appropriate workplace etiquette and develop workplace. Additionally, in this unit, students apply safety guidelines based on the manuals and instruction guides. They identify governmental and organizational regulations for health and safety at the workplace. They also list and describe various tools needed in the construction of robots. Finally, they plan, design, and construct a robot.