Introduction

What is engineering? If you type "define engineering" at google.com over twenty definitions are listed defining engineering. Many of the definitions are similar, but clearly there is no single definition for "what is engineering." For the purpose of this course we will use Webster's dictionary, 1 : the activities or function of an engineer 2 a : the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people b : the design and manufacture of complex products.

What is a robot? There are many definitions for "what is a robot." For this course we will use "a reprogrammable multifunctional manipulator that can move material, parts, or tools through variable programmed motions." This definition fits because many of the mechanisms that we will build are not fully autonomous. The study of robotics requires students to integrate control, mechanics, electronics, and fundamental math and science. Robotics may be the premier integrator of academics and workplace competencies available to education today. In this course students will discover how engineering process, mathematics, science, and interpersonal skills all play significant roles when solving robotic problems.

This course is built around the fundamental understanding of the systems that make up robots and the development of workplace competencies. The cornerstone of the class involves solving engineering design problems. The teacher will be placed in the role of a facilitator/mentor, the student in the role of project manager/problem solver. Upon completion of the course the student will be able to:

a) Identify, formulate solutions for, and solve engineering technology problems using engineering design processes

b) Apply knowledge of mathematics, science, and technology to solve robotic engineering technology problems

c) Apply techniques, skills, and technology to solve robotic engineering technology problems

d) Function on multi-disciplinary teams

e) Communicate effectively using all forms of communications

f) Recognize the need for, and demonstrate ability to engage in life-long learning

g) Describe various methods used to manage and schedule projects

h) Participate in and/or conduct design reviews

i) Collect, analyze and interpret data

This course is designed with two users in mind. The first user has the VEX starter kit without the programming kit plus accessories. The second user has the VEX starter kit plus the programming kit. There are several common threads that are woven throughout the course: engineering process, project management, communications, and teamwork. The beginning of the course is designed to quickly immerse the student into a team situation. They will build a Rube Goldberg mechanism. From there

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lessons are provided that give fundamental understanding of how radio signals are sent and received, how much a motor can lift, what mechanical advantage is, how can I program the radio using the default code to maximize radio control. As the course progresses, students will be given problems, a finite set of resources, and time. At the end of each project students are required to debrief; they will discuss what worked and what didn't. Students will become better problem solvers, project managers, and engineers with each problem that they solve.

You will need at least one RadioShack Vex® Starter Kit.

While the Vex Curriculum was designed to provide a very rich and extensive curriculum for those who only have a starter kit, to be able to use all of the Vex Curriculum materials, you will also need to purchase a Vex Programming Kit and the four additional sensor kits: light sensor, line follower, ultrasonic rangefinder, and optical shaft encoder. The Vex Programming Kit also includes Easy C® software you will need to program your robot.