**Technology and Engineering**

**Robotics Technology**

**Course Description**

The field of robotics requires a working knowledge of electronics, mechanics and software. It is usually accompanied by a large working knowledge of many subjects. Focusing on mobile robots and using a hands-on, collaborative approach, students will be introduced to the basic concepts/systems, terminology, and programming involved in robotics. This course will be of specific interest to students interested in applications of electronics, computer science, and physics.

Grade 9 - 12   
Prerequisite: None  
Course Number: 107680

**Course Expectations**

Rationale: Robotics and intelligent systems are found everywhere--smart cars, smart houses, smart buildings, health care technology, internet search engines, all phases of the shipping industry. . . intelligent systems are ubiquitous.

Time Frame: 1 Semester

**Standards Alignment**

Missouri Standards: Content Strands (opens in a new window)

-[Reading](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=CA&StrandID=1&theGrade=9)--[Writing](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=CA&StrandID=2&theGrade=9)--[Listening and Speaking](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=CA&StrandID=3&theGrade=9)--[Information Literacy](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=CA&StrandID=4&theGrade=9)--[Number and Operations](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=MA&StrandID=1&theGrade=9)--[Algebraic Relationships](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=MA&StrandID=2&theGrade=9)--[Measurement](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=MA&StrandID=4&theGrade=9)--[Force and Motion](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=SC&StrandID=2&theGrade=9)--[Science, Tech & Activity](http://www.pkwy.k12.mo.us/edline/curriculum/getGlesByGrade2.cfm?theArea=SC&StrandID=8&theGrade=9)-

National Standards (opens in a new window)

[National Educational Technology Standards for Students (NETS\*S)](http://cnets.iste.org/students/s_stands.html)

**Course Goals and Objectives**

Define robotics and what it means when we say robotics is an interdisciplinary field. Describe characteristics of robots that make them suitable for use in industry and commercial applications. Construct and/or design a robot that can complete a specific task

**Enduring Understandings**

Robots are everywhere and getting more prevalent everyday. Assembling a robot requires the correct selection of components and properly securing those components within that system. The ability of the robot to function depends upon the components selected. Microcontrollers form the brains for many devices we use everyday. Robots are composed of many different electrical components. The robots are only as intelligent as we program them to be.

**Essential Questions**

What is a robot? When should a robot displace a person? What is required to build a physically sound robot? How does the combination of devices enable the robot to perform the desired task? How do electronics enable a robot to operate autonomously? How do we enable a robot to operate autonomously?

**Essential Vocabulary**

Robot   
Mobile   
Autonomous   
Intelligent   
Industrial robotics   
Recreation robotics   
Programming   
Sensors   
Bolt sizing   
Locking collars   
Flat washer   
Split washer   
Locking washer   
Machine screws   
Plate sizes   
Axle   
Spacers   
Allen wrenches   
Open ended wrench   
Screwdrivers   
Material properties   
Inventory   
Gear ratio   
Mechanical advantage   
Hydraulics   
Pneumatics   
Bernoulli's Principle   
Pascal's Law   
Revolutions per minute   
Torque   
Levers   
Sensors Resistors Breadboard   
Capacitor   
SPSD   
Normally open   
Normally closed Closed system   
Open system   
PLC   
Digital   
Analog   
Potentiometer   
Voltage   
Current   
Amps   
Wattage   
Ohm's Law   
Watt's Law   
Microcontroller   
Servo/motor   
Input   
Output   
Programming   
Process   
Closed loop   
Open loop   
Input process   
Output feedback   
Basic programming language   
C programming language

**Course Materials: Representative Texts, Films and Resources**

T-Bots (one for every 2 students)   
Boe-Bots (one for every 3 students)   
VEX Robotics Kits (one for every 3 students)   
VEX Sensors   
VEX Programming Software & Cables

**Units of Instruction**

**1. Intro to Robotics**

Students will learn the basic principles, laws, types and uses of robots.  During this unit, students will also get an orientation to lab safety.

**2. Orientation to Structural Components**

This unit will teach the physical components in building a robot.

**3. Mechanisms**

This unit will teach students the different components that allow a robot to function and perform a task.

**4. Electrical**

This main focus of this unit is on basic electronic concepts, such as Ohm's Law, resistance, capacitance, basic digital logic, and microcontroller theory, which they then apply when learning to use and program robots.

**5. Programming**

This unit focuses on the logic used to make robots function in the autonomous mode.