**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.