

# Robotics (Business)

Elective – Semester – 9/10/11/12

Prerequisites: None

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## Course Description

Robotics is a naturally engaging learning tool that provides students with meaningful activities that introduce and reinforce applied physics and math concepts like ratios, diameter, radius, and circumference; friction; measurement of distance, time, angles, and speed; light and the electromagnetic spectrum; basic electricity and circuits; and more. At the same time, students are challenged to design their own original solutions to each problem presented, thereby developing the skills to be an out-of-the-box thinker. Science, Technology, Engineering and Math (STEM) are embedded into the projects.

## Course Goal

Students learn the importance of documentation, technological literacy, teamwork, and project management. The software that is a part of the LEGO MindStorms Kits uses an icon-based, diagram-building environment to write programs that control the students' robotics projects and has progressive programming phases that allow the programming level to match each student's knowledge and skills. We will explore God's wondrous creation and the effects of the laws of nature (gravity, friction, etc.) through projects that push, pull, lift and roll.

## Course Objectives

The student should be able to:

1. Program and build robots using Robolab and the LEGO Mindstorms System
2. Identify and demonstrate the major principles of programming such as algorithm, variable, conditional, iteration, parallel/serial processing and subroutines
3. Identify and demonstrate how input, output and processing is happening within a program, system and computerized device
4. Break a large algorithm into smaller pieces and write a well commented program in Robolab that executes those pieces
5. Identify and demonstrate basic systems ideas of feedback, network, flow, central control, and peer-to-peer
6. Present an algorithmic solution as executed by a robot and explain how the design of the robot and its programming execute the solution
7. Identify the main principles of programming and systems in real-world objects

## Course Outline

1. Robot history, examples and definition
2. Robolab interface
3. Robolab programming
4. Robolab – modifiers
5. Gearing
6. Context help in Robolab
7. Borrowing code vs. stealing code
8. Intro to Algorithms
9. Intro to program flow
10. Conditional statements
11. Multitasking

## Instructional Strategies

- Short lectures of instructions, review, or new material usually start each day.
- Students will then be given the opportunity to use a robot/computer individually on a daily basis to proceed self-paced with a project due date.
- Individualized instruction will be used for each student
- Students will be constantly evaluated on daily progress realizing that sometime you have to take a step back (completely rebuild) before you can move forward.

## Grading

- Tests and quizzes are taken on-line through the computer network
- Daily projects and a final project that incorporates a collective knowledge of a program to apply many of the skills learned will also be required
- You will be expected to complete work/projects in a timely manner. Due to the nature of the projects, an extension to complete a project may be given if the need warrants it.
- Final semester grades are determined by total points earned over total points possible
- Grading Scale
  - A+ 100-99
  - A 98-95
  - A- 94-93
  - B+ 92-91
  - B 90-87
  - B- 86-85
  - C+ 84-83
  - C 82-79
  - C- 78-77
  - D+ 76-75
  - D 74-72
  - D- 71-70
  - F 69-0

### **Student Materials**

- School computer network
- Lego MindStorm Robot Kit

### **Classroom Procedures**

Routines – Being self-motivated is a must for successfully completing this course. Taking initiative to solve problems and creating (unique) solutions will be expected.

Tardies – Students must be in the classroom before the bell rings.

Make-up Work – Students have the same number of days to turn in work as they were absent (e.g. gone 3 days = 3 days to make-up work). Late work will have the score reduced. It is encouraged that work be done prior to known absences.