

Berrien Springs Partnership Syllabus and Instructor Qualifications

CLASS TITLE: Electronics II

GRADE OR AGE LEVELS: 6th – 11th

START DATE: September 9th

END DATE: January 20th

WEEKS TOTAL: 17

WEEKS OFF: 3

DAY/TIME REQUIRED: Wednesday 2:30-3:30pm ADD'L DAYS/WK AVAILABLE:

HOURS (REQUIRED): 17

HOURS (OPTIONAL): 26 (approx.)

TOTAL SEMESTER HOURS POSSIBLE: 43

LOCATION/ADDRESS: Niles STEAM room: 2601 N. 5th Street, Niles, Michigan

MAIN INSTRUCTOR: Paul Oblak

CONTACT INFORMATION: phone: 269-697-0069 email: poblak@gmail.com website:
<https://funlearningcompany.com/>

ADDITIONAL REGISTRATION AT SITE REQUIRED? NO

MAIN INSTRUCTOR QUALIFICATIONS:

36 years as an Information Technology Professional encompassing everything from Mainframe operations and programming through all of the latest technologies including networking, servers, Business Intelligence programming and analysis, etc. Proficient at PC hardware building and diagnosis, etc. I Have taught classes at Lake Michigan College in Windows Servers, Fab Lab, and FIRST Robotics. Served as a CSA (Control Systems Advisor) for several years at FIRST Robotics competitions in Michigan.

I enjoy mentoring young people with the desire to see them reach their full potential as human beings and fully enjoy whatever they choose as a career field.

COURSE DESCRIPTION (complete overview shown on website):

This course will focus on applying electronic circuits to real-world scenarios and expanding students' skills in the engineering of electronic circuits.

We'll jump right into the SparkFun Inventor's Kit, which is an Arduino-powered kit that is compact yet versatile. We'll use this kit to discover all-new sensors and more advanced concepts in circuitry, like dividing voltage and even using code to give our circuits limitless functionality!

In addition to the SparkFun kit, we'll be revisiting KiwiCo's Electronics series with the Light-Up Speaker and Light-Chasing Robot. These kits will help students explore the core concepts of bringing sounds to life and discover some exciting new properties of light.

SYLLABUS/OUTLINE: weekly breakdown of Project-Based Learning activities

NOTE: This syllabus may vary based on student interest & experience

Unit 1: Measurement & Circuit Functionality (4 weeks)

1. Reviewing Electronics I
2. Measuring Electricity
3. Using a Multimeter

Unit 2: New Electronic Components (2 weeks)

1. Potentiometers
2. Tilt Switches

Unit 3: Abstract Electronic & Computational Concepts (5 weeks)

1. Microprocessors
2. Multisensor Circuits
3. Amplification
4. Digital vs. Analogue
5. Soundwaves & Frequency

Unit 4: Complex Components & Sensors (5 weeks)

1. Photoresistors
2. Sensing Distance
3. Sensing Motion
4. Sensing Temperature
5. Introduction to Final Project

Unit 5: Reviewing Electronics II (1 week)

1. Electronics II First Semester Review

COURSE OBJECTIVES AND APPROXIMATE TARGET DATES:

Overview: Students will be learning how to create, and creating, more advanced electronic circuits based on their accumulated knowledge from the previous Electronics I course. The course projects will be applied to real-world scenarios throughout the year.

Skills/Knowledge Required:

- **Learn how to use a digital multimeter to:**
 - **Measure different properties of electricity.**
 - **Manage power usage.**
 - **Prevent circuit malfunctions or faulty wiring.**
 - **Track/record power consumption in household items.**
- **Build circuits that make use of multiple sensors at once and grow skills with multi-sensor circuits.**
- **Explore sound more deeply and how it can be more effectively use in common and more advanced circuits.**
- **Explore the importance of different types of materials that make up the components used in the world of electronics.**
- **Learn about more advanced concepts surrounding light and light waves.**
- **Use new types of motors to expand knowledge of electromagnetic fields and different motor use cases.**
- **Dive into the basics of programming to level-up circuits with the power of simple computers.**
- **Experiment with new electronic components, including:**
 - **Potentiometers – how to dynamically divide voltage.**
 - **Tilt switches – how motion can affect a circuits functionality.**

- **Microprocessors – how to increase functionality of a simple circuit.**
- **Photoresistors – how light can affect electricity flowing through circuits.**
- **Ultrasonic sensors – how sound can be used to measure distance and motion.**
- **Temperature sensors – how variations in temperature can be measured.**
- **Light sensors – how light can be used to track color changes.**

Vocabulary: focuses primarily on electronic components, units of measure, and real-world applications (ex. “microprocessor”, “Hz”, and “climate control”)

STUDENT ASSESSMENT - what will be used to evaluate student progress and/or end of semester pass/fail status?

All classes abide by the following:

- 1) Student agrees to attend at least 80% of class sessions/lessons offered. Attendance is kept online and tracked by Partnership staff. Failure to meet 80% or be on track to meet 80% may result in program discontinuation.
- 2) The Partnership Student Assessment or Performance Form is filled out by the teacher and turned in to Partnership staff. The link to this form is found on the web page for this class. Failing marks for lack of participation, behavior issues, practice time, etc. may result in program discontinuation.

Class-specific assessment:

Our instructor will evaluate each student using Berrien’s evaluation form and passing criteria will be based solely on students attending and actively participating in the class sessions.

ADDITIONAL RESOURCES: (online, books, video, etc.):

Students will have their own multimeter, Sparkfun Inventor's kit, and Kiwico Electronics Pack Light-Chasing Robot + Light-Up Speaker. Our instructor will recommend additional content pertaining to what is covered in class, as well as what students are interested in.

CLASS POLICIES: ATTENDANCE, BEHAVIOR, WEATHER, ETC.

Attendance: attendance is required, and students should notify the instructor in advance of any absence.

Behavior: any behavior issues will first be privately brought to the attention of the parent and, should the behavior persist, to the partnership staff.

Weather: the classes will be cancelled on any days when Berrien Springs Public Schools are closed. We will also contact families to remind them of this in the event of a weather-related cancellation. We will make up any canceled class meetings at a later date.