Overview:

The purpose of this program is to expose students to the process of designing an experiment, using automation tools to collect a large amount of data quickly and easily, and using software to analyze that data and reach a conclusion.

Goals:

* Provide a functional understanding of basic computer science and electrical engineering principles.
* Create a deniable hypothesis, and design an experiment to test it.
* Program and set up Arduinos to automatically collect data.
* Analyze and graph data using Python.

Topics:

* Computer Science
  + Overview of different languages and uses for programming
  + Fundamental data structures
  + Statements and loops
  + Big-O notation and complexity
  + Testing code
* Electrical Engineering
  + Quick overview of different electronic devices and their applications
  + Electron flow, simple understanding of how electronics work (1/2 a day max)
  + How to wire sensors for the Arduinos
* Arduino
  + Hello, World!
  + Sensors
  + Data collection and storage
* Python Libraries
  + Hello, world!
  + Reading data
  + Pip and packages
  + Making plots with PyPlot
* Experimental Design and Statistics
  + How to design a deniable experiment
  + Experimental controls
  + Hypothesis testing
  + Z-score and determining statistical significance

Timeline

* Days 1-2
  + Computer science basics and electrical engineering basics (without wiring)
* Days 3-4
  + Arduinos hello world to automation
* Day 5
  + Experimental Design, deniable experiments, hypothesis testing, choosing experiments.
* Day 6
  + Wiring and setting up an Arduino
* Days 7-8
  + Setting up experiments for automation and collection
* Day 9
  + Python hello world, pip and packages
* Day 10
  + Reading data from a source, start plotting it
* Day 11
  + Statistical Significance, plotting it
* Day 12
  + Plot and make conclusions on Arduino data