



## Raspberry Pi Engineering 7-9 Syllabus

### Course Goals

#### 1 Introduction to Linux

Students learn how to use basic commands to navigate and use the Linux operating system.

#### 2 Understanding Basic Electronics

Students learn about resistor and LED electrical circuits, with emphasis on Raspberry Pi interfacing.

#### 3 Programming in Python

Students learn to write code in Python. This code will interface with the Raspberry Pi for custom button controls.

### Course Topics

#### 1 Basic Commands

Students create, delete, and move files via command line.

#### 2 Camera

Students learn to operate the Raspberry Pi camera.

#### 3 Audio

Students learn to configure the Raspberry Pi to play sounds.

#### 4 Circuits

Students learn electrical theory, including concepts with resistor and LED circuits.

#### 5 GPIO

Students learn to use the Raspberry Pi's GPIO pins to interface with different types of hardware.

##### 5.1 Input

Students learn to poll GPIO pins as sensors for program logic.

##### 5.2 Output

Students learn to set logic levels to control circuits.

#### 6 Python

Students learn coding structures and styles of Python.

#### 7 GPS

Students understand the Global Positioning System and communicate with it.

### Course Schedule

#### Day 1

##### Introduction

Students introduce themselves to their peers and instructor(s) and share their previous knowledge of programming and electronics.

## **Installing Raspbian**

Students set up the operating system on their Raspberry Pis with Raspberry Pi's New Out Of Box Software (NOOBS)

## **Installing NOOBS**

Students take additional steps to prepare the SD card.

## **Configuration Settings**

Students make small changes for optimal use.

## **Intro to Linux**

Students learn to navigate through directories and add, move, and delete files.

## **Day 2**

### **Slow and Steady: Programming with Turtles**

Students learn basic programming concepts while using Python's Turtle library to draw shapes of their own choosing.

### **Super Sonic**

Students use Sonic Pi to create music through code.

## **Day 3**

### **Security Camera**

Students learn to use the Raspberry Pi camera.

### **Face Detection and Photobooth**

Students create code that can recognize facial features and create virtual props.

## **Day 4**

### **LED Circuitry**

Students can illuminate LEDs on command with simple circuitry and code.

### **Resistor-Diode Gates**

Students create the logical gates AND and OR using circuitry.

## **Day 5**

### **7-Segment LED**

Students work with and illuminate a 7-segment LED.

### **7-Segment LED with Keyboard Input**

Students enter a line of text, and the seven segment display will show each of the letters.

## **Day 6**

### **Blinky Lights**

Students code lights to blink on and off on a one-second interval.

### **Designing Your Own Circuits**

Students use what they've learned about circuits to experiment and design their own creations.

## **Day 7**

### **Tic-Tac-Toe**

Students program the game tic-tac-toe as a 2-player game.

### **Ping**

Students learn to create one-player versions of the popular Pong game.

## **Day 8**

### **Networking**

Students learn the basics of computer networking by sending messages between linked Raspberry Pis.

### **GPS**

Students learn how GPS works and see a GPS receiver interface with the Raspberry Pi

## **Day 9**

### **Pie Man**

Students create a game based off of the classic game Pac-Man.

## **Day 10**

### **Minecraft Maze Maker**

Students generate and explore a maze in Minecraft using Python.

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