



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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