

Learning objective completion exercise (2019)

“√” if we've done it.

“X” if we haven't.

“?” if you're not sure, or it wasn't done well or completely.

- **Correctly use electrical terminology when discussing electrical circuits and their components**
- **Read data sheets for electronic components to determine how to use them**
- **Use digital meters to measure DC voltages, currents, resistances and continuity**
- **Use oscilloscopes to measure DC voltages and time intervals**
- **Set up DC supplies and function generators to produce voltages and waveforms as needed**
- **Understand the characteristics of series and parallel circuits**
- **Identify the behavior of diodes, (including LEDs), and capacitors in DC circuits**
- **Understand the uses of common circuit configurations such as voltage dividers and Wheatstone bridges, including the use of variable resistors**
- **View digital logic gates as DC circuits with voltage, current, and timing limits**
- **Recognize the use of different logic gate I/O types; specifically totem-pole, open collector (open drain), and tri-state**
- **Design circuits to allow connection of 3.3V and 5V devices.**
- **Identify common operational amplifier circuits and explain their operation**
- **Design circuitry to convert output from a sensor to a voltage which falls within a specified range**
- **Design circuitry to control an actuator from an input signal which falls within a specified range**
- **Evaluate sensors and other devices to determine whether they can directly connect to GPIO pins on the Raspberry Pi**
- **Become familiar with the Linux command line interface.**
- **Write Python programs to control the GPIO pins on the Raspberry Pi, including features like PWM and UART, SPI, and I²C interfaces.**
- **Adapt code for real-time operation with multiple independent sensors and actuators.**
- **Break down a problem into modules which can be tackled individually before being combined into a complete solution**
- **Create block diagrams for circuits and sub-circuits to explain complex circuit designs**
- **Draw schematic diagrams of circuits**
- **Sketch waveforms of electrical signals and identify important information**
- **Maintain a professional lab notebook which records and summarizes all important lab results and insights.**
- **Find, evaluate and use online resources to incorporate unfamiliar devices.**