About the technical interview

The goal of the technical interview is for you to synthesize what you have learned in this course by applying it to a new problem. It will work roughly like this:

- I'll give you a problem involving a kitchen appliance.
- You'll need to think about how the device works and understand the schematic to reason about its behavior.
- You may need to use a multimeter to investigate the appliance (or part of it).
- Depending on time, you may write some code to emulate part of the device.

The interview is a conversation, not an interrogation, and I'm trying to gauge your overall understanding and ability to use the course material to solve problems rather than how well you can memorize specific details. So I'll prompt you if you're stuck or headed off on the wrong track. You also shouldn't worry if we don't "finish" everything; I'll have two hours' worth of questions and we only have 30 minutes!

Review guide

Almost all of the items in this list are taken straight from the learning objectives presented in lecture ("By the end of class, you should be able to...").

They are written with action verbs — i.e., they are things you should be able to *do*, not things you should "understand" or "know" or "appreciate". So if you're in doubt, grab a friend, and try to do these things!

Module 1: Circuit fundamentals

- Explain what voltage and current are, and how they are different
- Explain what resistance is
- Use Ohm's law to calculate voltage/current/resistance
- Use a DMM to measure voltage and resistance
- Explain what power is, and how it's different from energy
- Use Watt's law to calculate power consumed in a circuit
- Read an electrical schematic and identify components such as resistors, switches, and heating elements
- Given a physical device (such as a tabletop appliance), draw an electrical schematic

Module 2: Microcontrollers

- Describe how a breadboard is connected internally
- Use a breadboard to build circuits involving switches, LEDs, resistors, and wires
- Write Python code to define variables and functions
- Write Python code using `if` and `while` loops
- Write Micropython code to control an LED or read the state of a switch
- Explain the difference between making a pin an output, an input, or an input with a pull-up
- Given an English description of a system, draw a state diagram to describe its behavior

Module 3: Inputs and outputs

- Explain what PWM is, in terms that someone just starting the course could understand
- Explain the difference between measuring a value with an ADC versus a digital pin

Module 4: Networking and IoT

- Explain the difference between a MAC address and an IP address, and why both are useful
- Using a reference, write Micropython code to grab content from a web page or data from a public API
- Explain the following MQTT terms: broker, client, publish, subscribe, topic, payload
- Using a reference, write Micropython code to publish data using MQTT

- Explain in general terms the difference between MQTT and HTTP, and why MQTT is suited for IoT
- Describe what an "endpoint" and a "response" are, and explain how Python code can work as a web server