Filament Sense
Schematic Diagram

In this lab you will create a schematic diagram for the Filament Sense project. The Filament Sense is a device to monitor the filament moving into your 3D printer. If it detects a filament stoppage, it will text, or email you to alert you of the problem.

The Filament Sense uses the 12 volt power supply that your 3D printer is powered with. The 12 volts is regulated down to 5 volts with an AP3211 buck converter switching regulator. This voltage supplies a WEMOS D1 Mini, which is an ESP8266 processor on a small printed circuit board (PCB). This processor can connect to a WIFI network; it monitors an HY301-07A photo interrupter to detect filament movement. It is connected to an LED output indicator, and two general purpose input/output (GPIO) pins made available to the 3D printer. It is programmable using the Arduino framework, and works with in concert with the Blynk phone app for notifications, email, etc. You will make a PCB with all this mounted on it.

The schematic is a very important document to electrical engineers. It is the principle document for electrical designs. To do a good job with the schematic, please watch the four videos on EESchema, the Kicad schematic capture application that your professor made recently. Make sure each part has the correct datasheet document associated with it. Use a buss for routing D2 and D1 (pins 5 and 6 or the WEMOS D1 Mini) to the connector. Each part should be associated with a footprint, which is the pad layout the PCB uses. CAD files for the WEMOS D1 Mini are on github. Google will help you find datasheets for the other parts. Use 0805 (2012 metric) 0.25 watt Rohm chip resistors, and 0805 X5R or X7R capacitors. The inductor is a 100 uH Taiyo Yuden NR Series type S. Do a schematic check (big icon), and do your best to ensure there are no errors in the schematic or in the associated footprints. A common error is that the pin numbers are different between the schematic and the footprint. Check them all.

A rough schematic is provided in another document for you to use that shows what hooks to what.