# **Planned Stages**

## Stage A – Initial Design

1. ~~Design 8~~~~th~~ ~~order Chebyshev filter /w fp = 3kHz, fs = 4kHz, δp = 0.1, δs = 0.01 in MATLAB and get filter poles. Also, need to ensure that filter gain isn’t too high at any given frequency. This will be a loose requirement but let’s just say to keep the output magnitude at any frequency as close to one as possible within the passband.~~

Hours spent: 6h

Notes: Already had a lot of work put into this from DSP, so lots of time saved here.

1. ~~Using Sallen-Key stages, select components for implementing this 8~~~~th~~ ~~order filter implemented as a cascade of four 2~~~~nd~~ ~~order Sallen-Key stages. (By simulate, I mean Bode plots)~~
2. ~~Simulate each stage in PSIM, export data values, import into MATLAB, and compare with designed stages.~~
3. ~~Stage 1~~
4. ~~Stage 2~~
5. ~~Stage 1 + Stage 2~~
6. ~~Stage 3~~
7. ~~Stage 1 + Stage 2 + Stage 3~~
8. ~~Stage 4~~
9. ~~Stage 1 + Stage 2 + Stage 3 + Stage 4~~
10. ~~Have to redo design because standardized component selection has caused resulting frequency response to deviate too much from original design… We went from ~3kHz cutoff to ~1.5kHz… So, redesign perhaps for cutoff of around 6kHz and repeat steps 2a quickly.~~
11. ~~Now select components that are standard values closest to the chosen ones.~~
12. ~~Recompute stage poles as a result of this.~~
13. ~~Repeat step a) /w original design, standardized circuit, MATLAB design.~~

## Stage B – Initial Lab Testing/Verification

1. Go into lab and begin breadboarding circuit.
   1. ~~Find standard components and measure /w multimeter. Note down on paper and lay them out.~~
   2. ~~Verify that the LM741 op amps work.~~
      1. ~~Use quick inverting amplifier circuit /w x3 x2 and verify operation from DC to 50kHz.~~
      2. ~~Note down required decoupling caps. 🡪 22uF so far so good.~~
      3. ~~Make quick LM741 op-amp testing rig~~
   3. ~~Select appropriate breadboard and figure out needed power supplies.~~
   4. With measured component values, repeat Stage A step 2a, both in simulation and on breadboard. At each point, select 5 frequencies for testing, have screenshot of expected frequency response, and print. Take pictures and videos of each result. You probably will also ask some Reddit questions along the way for certain things you’re not sure about.
      1. *Lots of troubleshooting…*
   5. Clean up the board and port it out for ease of use as a ver. 0 dev board.

## Stage C - KiCAD

1. Once all the kinks are worked out, time to KiCAD this mofo.
   1. Schematic
   2. PCB Layout of dev board (components that are readily available from ECE!!)