**Filters (Low-pass and High-pass)**

**Low-pass Filters (LPF)**

By combining a resistor with a capacitor as shown, you can make a low-pass filter. The output is approximately equal to the input at low frequencies (approximately < 2\(\pi RC\)), but goes to zero for higher frequencies. The capacitor will only allow current to flow through to ground it if it sees a high frequency voltage at the input. Therefore, the above arrangement will allow low frequencies to get to the output side \(V_o\) while preventing higher frequencies from getting through. This is a **low-pass** filter because lower frequencies are allowed to pass while high frequencies are blocked.

\[
f = \frac{1}{2\pi RC}
\]

**High-pass Filters (HPF)**

Again, the capacitor will only allow high frequencies to pass through it. Therefore, only high frequencies (approximately > 2\(\pi RC\)) can get through and low frequencies cannot. This is why this circuit is called a **high pass** filter.

\[
f = \frac{1}{2\pi RC}
\]