

# ECS512 Sound Design

## Lab 2: Delay

Please go through each of these topics and make sure you understand them as they will prime you for Assignment 1.

- Audio Delay
  - Go through tutorial section 3.4.1.3. <http://www.pd-tutorial.com/english/ch03s04.html>
  - Use `[line~]` to create an envelope for the oscillator. Sending a message such as `[1, 0 1000]` to the first inlet will be sufficient.
  - Create two more delay reads using a different delay time for each. This is equivalent to a multi-tap delay.
  - Route the output of `[vd~]` to the input of `[delwrite~]` to generate feedback.

**Important** make sure you put a `[*~ 0.9]` before the input to `[delwrite~]`, so that the amplitude of the signal eventually decays to zero.
  - If successful, your patch should simulate a reverb effect. For an overview of reverb, see <https://en.wikipedia.org/wiki/Reverberation>
- Comb Filtering
  - Go through section 3.4.2.8
  - For an overview of comb filtering, see [http://en.wikipedia.org/wiki/Comb\\_filter](http://en.wikipedia.org/wiki/Comb_filter)
  - Create a flanging effect: use a low frequency oscillator (LFO), such as `[osc~ 0.1]` connected to `[*~ 100]`, to modulate the delay between +/- 100ms.
- Karplus-Strong Algorithm (*Hint: Assignment 1 is based on this algorithm*)
  - Go through section 3.4.2.10 and make sure you understand the theory.
  - This is the simplest type of digital waveguide synthesis, used for basic synthesis of all sorts of musical instruments.
  - More information here: [http://music.columbia.edu/cmc/musicandcomputers/chapter4/04\\_09.php](http://music.columbia.edu/cmc/musicandcomputers/chapter4/04_09.php)