

LEARNING SYNTHS PLAYGROUND

Navigate to [LearningSynths.Ableton.com/en/Playground](https://learningsynths.ableton.com/en/playground), which is a simple, digital synthesizer instrument made by **Ableton**. Each of these controls, representing physical modules, is based on a math equation. (Those equations are shown below.)

Adjust the different sliders and notice how the sound changes. Do some modules work together better than others? If so, why do you think that is the case?

The image shows a screenshot of the 'Learning Synths Playground' interface with several mathematical equations and graphs overlaid on different modules:

- Square Oscillator:** $x(t) = \text{sgn}(\sin(2\pi f \cdot t))$
- Saw Oscillator:** $y(t) = 2 \left\lfloor \frac{t}{p} - \left\lfloor \frac{1}{2} + \frac{t}{p} \right\rfloor \right\rfloor$
- Amplitude Envelope:** $e(t) = \sqrt{x(t)^2 + \hat{x}(t)^2}$
- Low-Pass Filter:** $y(n) = x(n) + x(n-1)$
- LFO:** $R = n \left(\frac{T}{240} \right)$
- Noise:** $G(\omega) = 2 \left| \cos\left(\frac{\omega T}{2}\right) \right|$

The interface includes various sliders and controls for each module, such as Amplitude, Width, LFO Amount, Envelope Amount, Detune, Frequency, and Resonance. The 'Amplitude Envelope' module shows a graph of a triangular wave, and the 'LFO' module shows a sine wave. The 'Envelope' module shows a graph of a complex waveform.

Learning synths. Learning Synths. (n.d.). <https://learningsynths.ableton.com/en/playground>