

# MUS 6: Electronic Music

## Section Lecture 3

*Wednesday, October 21, 2020*

# Lecture Outline

1. Announcements
2. General Information
3. Music Intervals
4. Homework 1 (Ableton Live Basics)

# Announcements

- Homework Assignment #1 is DUE by Friday, [Oct 23](#) at 11:59 pm

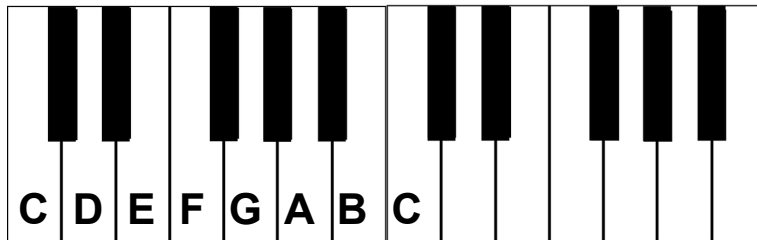
# General Information: Student Question

- When I play the low E note on a guitar, I also hear a B note. Does the presence of the B note have something to do with the Fourier series?
  - Yes, it does! The B note you hear (246 Hz) is the 3rd harmonic of the fundamental frequency (82 Hz) of the low E string. That is,  **$3 \times 82 \text{ Hz} = 246 \text{ Hz}$** .
  - From physics, we know that a guitar string vibration can be described using a Fourier series. For the low E string, the Fourier series is the sum of all appropriately weighted harmonics of the sine wave vibrating at 82 Hz. The B note at 246 Hz is the third member of this series.
  - Let's use the spectrum analyzer in Ableton to visualize this...

# **Music Intervals**

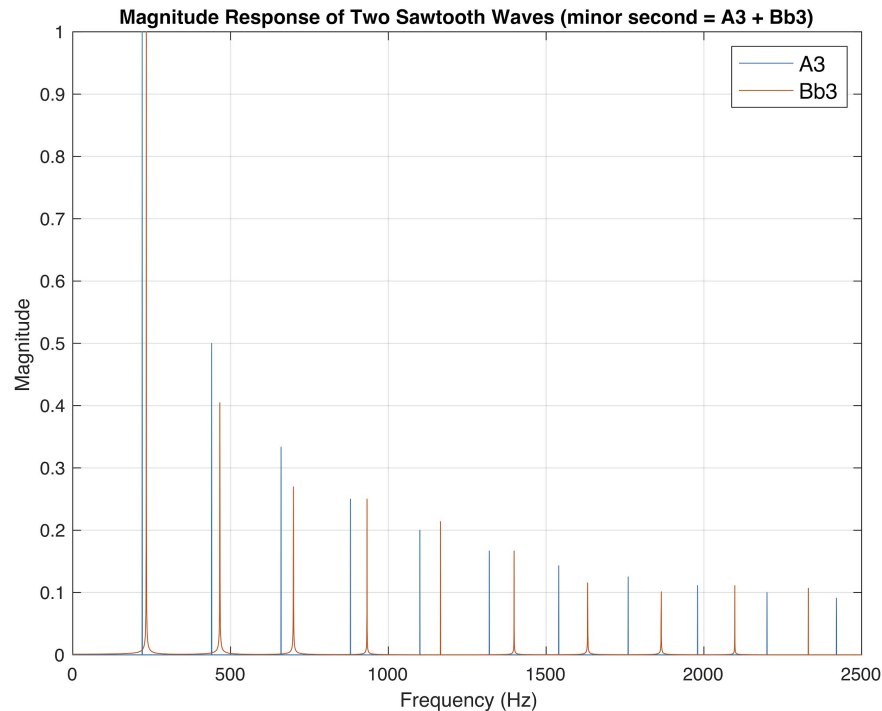
# Module 4: Music intervals

- A music interval is **the difference in pitch between two musical tones**
- Pitch is a person's *subjective perception* of frequency. In this lecture, we'll consider pitch and frequency to be synonymous. However, in certain contexts, a person may perceive a different frequency from what is actually played. For example, a person could perceive two frequencies played at 1000 Hz and 1200 Hz as having a fundamental frequency of 200 Hz.



# Module 4: Music intervals

- **Audio Samples:**  
<https://chadmckell.com/intervals>
- Some intervals sound more **rough** (unstable) than others. Roughness is caused by our ear's inability to distinguish between multiple tones.
- Several partials of the minor second interval played using two **sawtooth waves** lie close to each other (see plot). This can cause roughness.



# Module 4: Music intervals

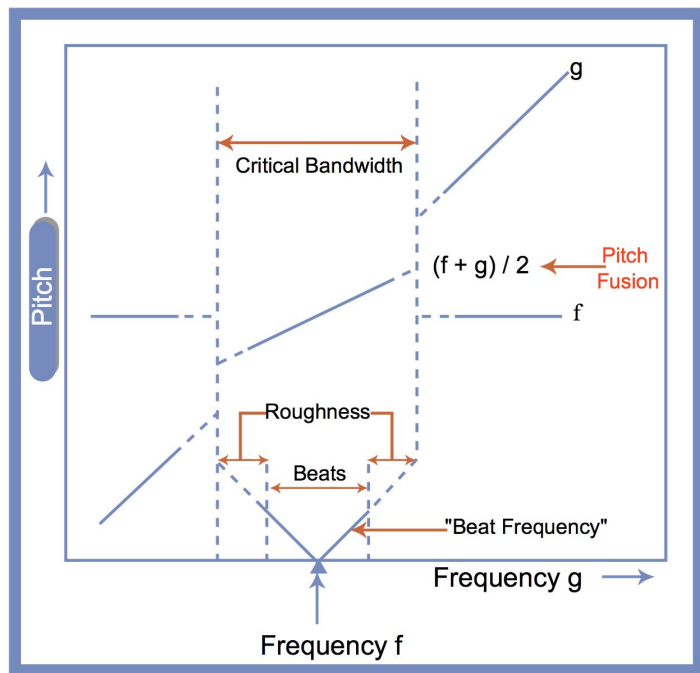


Figure by MIT OpenCourseWare.

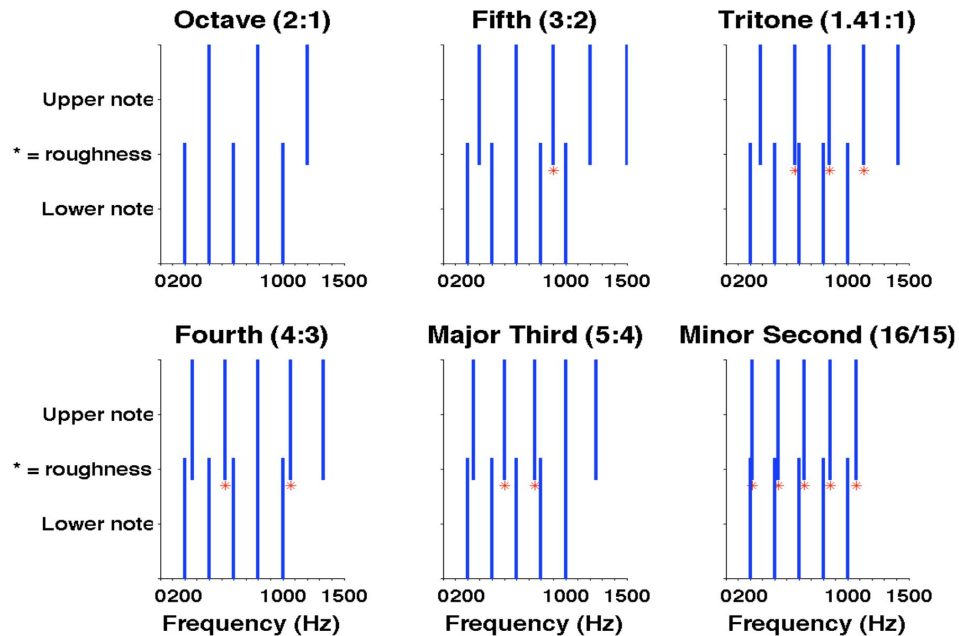


Figure by MIT OpenCourseWare.



# Module 4: Consonance vs. dissonance

- **Consonant (stable)** intervals sound **less rough** while **dissonant (unstable)** intervals sound **more rough**. The table below shows some consonant intervals associated with “harmonic” instruments (e.g. Western classical).

CONSONANT INTERVALS							
Name of Interval	Octave	Fifth	Fourth	Major third	Minor third	Major sixth	Minor sixth
Notes (in Key of C Major)	C-C	C-G	C-F	C-E	E-G	C-A	E-C
Ideal Frequency Ratio	2	3/2	4/3	5/4	6/5	5/3	8/5
Number of Semitones	12	7	5	4	3	9	8

Figure by MIT OpenCourseWare.

# Module 4: Consonance of harmonic complexes

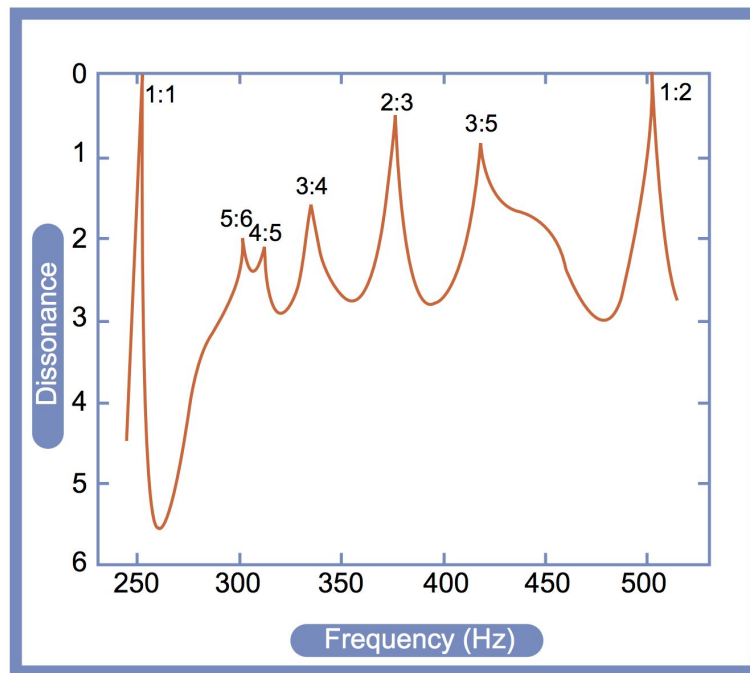


Figure by MIT OpenCourseWare.

# **Homework 1 (Ableton Live Basics)**

# Homework 1: Lecture schedule

- **Previous lectures:**

- Drum patterns
- MIDI data
- Audio samples
- Favorites bar
- Automation

- **Today:**

- Canvas submission guidelines (assignment + discussion)

# Homework 1: Canvas Submission

- Submit your assignment in two places on Canvas:
  - Under “Assignments”
  - Under “Discussions”
- Include the following in your “Assignment” submission
  - Your audio file (it must be **at least one minute** in duration)
  - Your Ableton project folder
  - A screenshot for each of the 5 bullet points
  - A short (2-3 sentence) description for each of the 5 bullet points
- Include the following in your “Discussion” submission
  - Your audio file
  - A brief (2-3 sentence) description of your piece

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# Homework 1: How to embed an image














- First, click the “Embed Image” icon.

[File Upload](#) [Text Entry](#) [Website URL](#) [Media](#) [Google Drive](#)

Copy and paste or type your submission right here.

HTML Editor

**B** *I* U A A I<sub>x</sub>       $x^2$   $x_2$   

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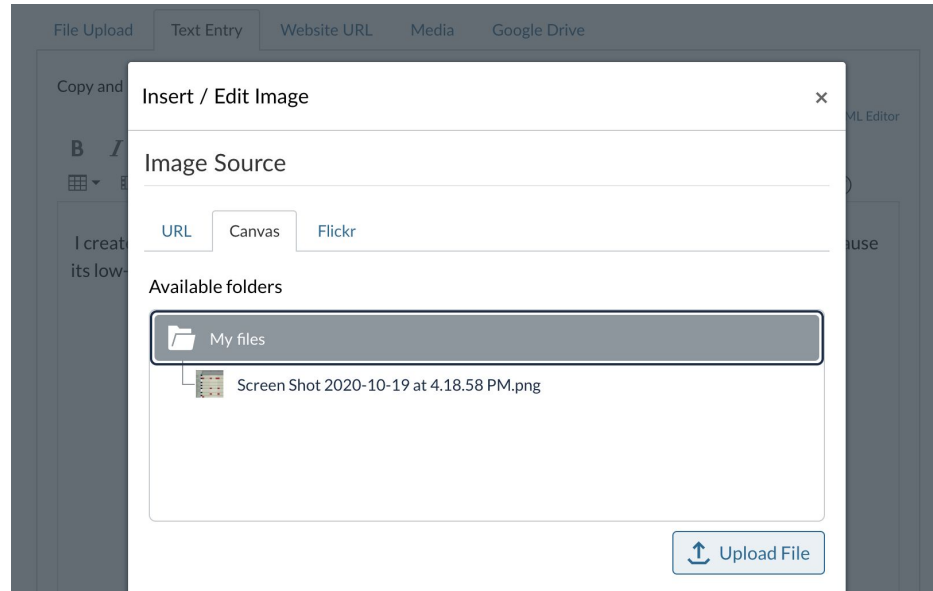
Embed Image

I created a waltz drum pattern using the classic 808 drum kit. I chose the classic 808 drum kit because its low-frequency sounds balanced out the high-frequency sounds of the melody.

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# Homework 1: How to embed an image

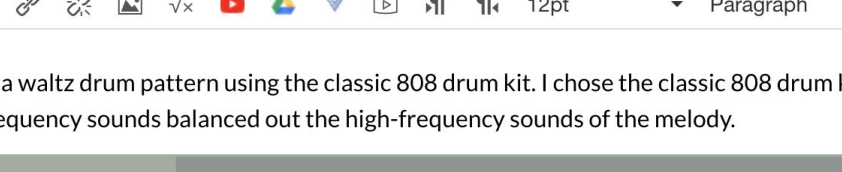
- Upload your file to the “Canvas” tab. Then, click “Update”.



# Homework 1: How to embed an image

- Your image should now appear in the text box.

I created a waltz drum pattern using the classic 808 drum kit. I chose the classic 808 drum kit because its low-frequency sounds balanced out the high-frequency sounds of the melody.



The screenshot shows a DAW interface with a piano roll and a drum track. The piano roll has a 'Fold' button and a timeline with measures 1, 1.2, and 1.3. The drum track below it shows a pattern of hits for Clave 808, Cowbell 808, Cymbal 808, and Tom Hi 808. The Cymbal 808 track shows hits at measures 1, 1.2, and 1.3, labeled 'Cy'.



# Homework 1: What to include in the descriptions

- At the bare minimum, you should state what sound or pattern you used for each bulleted item. For example, in bullet point #1 (drum patterns), you could say that you created a waltz drum pattern using the classic 808 drum kit.
- You could also discuss any of the following for each bullet point:
  - Why you chose to use particular sounds or musical patterns
  - What stumbling blocks you ran into and how you overcame them
  - What you like about your piece
  - How you think your piece could be improved
- The description in your “discussion” submission could be a short summary of the descriptions from your “assignment” submission.

# Questions