FROST | SCHOOL OF MUSIC
UNIVERSITY OF MIAMI

MIDDLE- AND HIGH-SCHOOL CURRICULA FOR MUSIC TECHNOLOGY LESSONS WITH AND WITHOUT ARTIFICIALLY INTELLIGENT TOOLS

From the Concerts with Humans and Artificial Intelligence (CHAI) project: https://chai-music.glitch.me

v1.2 Jan 2025

Authors: Raina Murnak, Amanda Pasler, Eli Yaroch, Ryan Baker, Spencer Soule, Aditya Jeganath K., Jack Reilly, Lívia de Moraes, Taylor Wright, Chris Bennett, and Tom Collins

Contents

Introduction

At the Frost School of Music, we utilize our Experiential Music Curriculum™, which places doing at the center of learning. The following lesson plans are developed on this premise – that a good way to gain understanding of and fluency in AI tools for music analysis and creation is to be exposed to using such tools.

These curricula are a product of research supported by a University Laboratory for Integrative Knowledge (U-LINK) grant at the University of Miami.

The funded project is called Concerts with Humans and Artificial Intelligence (CHAI): https://chai-music.glitch.me

The authors are faculty professors, and students at undergraduate and graduate levels, who developed the materials collaboratively beginning April 2024.

The materials were used as part of the Shalala MusicReach Summer Institute June—August 2024. We conducted a scientific study investigating how integration of AI into the music technology curriculum impacts children's self-efficacy and positive/negative affect. If you make use of these curricula, please cite the corresponding paper:

Collins, T., Murnak, R., & Bennett, C. (under review). "The kids are alright: Investigating the impact on children of integrating artificial intelligence into the music technology curriculum"

We found that AI integration does not have a notable effect on children's self-efficacy or emotional well-being; moreover, we observe strong signs of their enthusiasm. Additional studies are needed to validate these results, but these initial findings suggest that middle- and high-school children are emotionally prepared for -- and positively inclined toward — the integration of AI into music curricula.

Where possible, we use **free software** in the form of web services, downloadable applications, and plugins. The pace of change in AI (for music) is fast. We note that Ableton Live Lite is a solid digital audio workstation (DAW) with downloads for macOS and Windows. You are welcome to tell us if any links are dead in the following lesson plans, or free initial use of certain tools is no longer possible.

Generally, if you have questions about integrating the following lesson plans into your own teaching, we are happy to answer them at tom.collins@miami.edu or r.murnak@umiami.edu.

If you use one or more of the lesson plans, you are also welcome to tell us how it went!

Tom & Raina

Lesson [identifier]

LESSON PLAN

Delete one x!

[x] With AI session
[x] No AI session

Delete one circle!

Week #	Date	Time:	Level (circle)
1	Tue Jun 11th	2-3 pm	MS / HS

Topic

Intro class

NOTES:

For this intro class, the With AI/No AI distinction is not relevant; neither particularly is MS/HS.

Lesson Aims & Objectives:

To introduce the program to the students, get to know them, and start teaching the basic lingo and topics of music technology.

Activities and Tools/Sites/Materials:

No special tools needed, mostly getting to know students

TIME LINE (list activities per each 10 minutes):

1. Introduce students (name, preferred pronouns, musical interests) Will also have a funny question to be determined.
2. Code of conduct explanation
3. Explanation that Creative Studio may have footfall from UM students.
4. Time-zero questionnaire
5. Going over plan for semester.
6. Music tech lingo

Lesson W_A

LESSON PLAN

☐ With AI session
☐ No AI session

Week #	Date	Time:	Level (circle)
1	Tue Jun 11th	2-3 pm	MS / HS

Topic

Intro class

NOTES:

For this intro class, the With AI/No AI distinction is not relevant; neither particularly is MS/HS.

Lesson Aims & Objectives:

To introduce the program to the students, get to know them, and start teaching the basic lingo and topics of music technology.

Activities and Tools/Sites/Materials:

No special tools needed, mostly getting to know students.

TIME LINE (list activities per each 10 minutes):

1. Introduce students (name, preferred pronouns, musical interests) Will also have a funny question to be determined.
2. Code of conduct explanation
3. Explanation that Creative Studio may have footfall from UM students.
4. Time-zero questionnaire
5. Going over plan for semester.
6. Music tech lingo

Lesson W_B

LESSON PLAN

[X] With AI session
[ ] No AI session

Week #	Date	Time:	Level (circle)
1	Thu Jun 13th	2-3 pm	MS / (HS)

Topic

Stem splitting

NOTES:

Pre-download some music onto classroom computers.

Lesson Aims & Objectives:

Learn meaning of the term “stem”.
Learn how stem splitters can be used to “hear inside” as well as remix songs.

Activities and Tools/Sites/Materials:

Splitter (https://splitter.ai)
Ripple – Music Creation Tool (available on the App Store)

TIME LINE (list activities per each 10 minutes):

1. Listen to a song; listen to a remix of the song.
2. Discuss with students how remixes are made.
3. Discussion of aspects such as tempo and key (more in-depth for HS)
4. For HS only, discussion of sampling, including a demo of sampling
   [The above steps should all be complete by ~20 mins.]
5. Use Splitter or Ripple to demonstrate stem splitting for two audio files of choice on the classroom computers.
6. Take the splits and use them to try to make a remix.
7. Share back initial results.

Lesson W_C

LESSON PLAN

[X] With AI session
[ ] No AI session

Week #	Date	Time:	Level (circle)
2	Tue Jun 18th	2-3 pm	MS / (HS)

Topic

Extending MIDI in Ableton Live

NOTES:

Ableton Live and Magenta Studio need to be installed prior to class.

Lesson Aims & Objectives:

Introduce Ableton Live's Session View v Arrangement View.
Use AI to build upon existing melodies or drum tracks.

Activities and Tools/Sites/Materials:

Ableton Live (https://www.ableton.com/en/live)
Magenta Studio (https://magenta.tensorflow.org/studio)

TIME LINE (list activities per each 10 minutes):

1. Make sure students are set up on Live's Session View and help them get familiar with how the DAW works, absent any AI.
2. Get Magenta Studio plugin set up on a melody or drum track.
    a. Instructor to do a live demo of how it works.
    b. Can use external MIDI controller for added emphasis on the live aspect.
3. Let the students experiment with the software to produce their own tracks.
4. If they experimented with AI-extending/altering a melody, now switch to do similar but with a drum track, and vice versa.
5. Share back if time allows.

Lesson W_D

LESSON PLAN

- [x] With AI session
- [ ] No AI session

Week #	Date	Time:	Level (circle)
2	Thu Jun 20th	2-3 pm	MS / (HS)

Topic

Vocal synthesis and emulation

NOTES:

If students do not have vocals to use, they will be provided with examples from which to choose.

Lesson Aims & Objectives:

Explore the task of text-to-speech for rap generation.
Learn how to turn one voice into another (voice emulation or cloning) utilizing software.

Activities and Tools/Sites/Materials:

Kits AI (https://www.kits.ai/tools/text-to-speech)
Musicfy (https://create.musicfy.lol/create/voice)

TIME LINE (list activities per each 10 minutes):

1. Present the topic and the technology.
2. Explain the upcoming activity and expectations. Answer any student questions.
3. Students will generate a rap using Kits AI.
4. Discuss and share.
5. Students will emulate an artist in Musicfy using either their own vocal or one of the files provided.
6. Discuss the ethical and legal implications of voice emulation and cloning. Compare Kits AI and Musicfy in these regards.

Lesson W_E

LESSON PLAN

[X] With AI session
[ ] No AI session

Week #	Date	Time:	Level (circle)
3	Tue Jun 25th	2-3 pm	MS / (HS)

Topic

MIDI beat-making

NOTES:

Cocreate does not require a DAW, but does require an account and email via which to receive results.

Lesson Aims & Objectives:

To teach the basics of Musical Instrument Digital Interface (MIDI).
How to create beats from scratch.

Activities and Tools/Sites/Materials:

Hip hop beats from MAIA Markov on Cocreate (https://cocreate.glitch.me)
SOUNDRAW (https://soundraw.io) if budget allows.
Use DAW of preference.

TIME LINE (list activities per each 10 minutes):

1. Brief lesson on MIDI (what it means, how it works, where it came from, why it is used).
2. Assign pairs and load Cocreate.
3. Instructor demonstrates generation of a hip hop beat using MAIA Markov on Cocreate.
4. Have students try for themselves.
5. Introduce a competitive aspect if you like, such as a beat-making competition where classmates vote for their favorite generated (+ human-altered) beat.

Lesson W_F

LESSON PLAN

- [x] With AI session
- [ ] No AI session

Week #	Date	Time:	Level (circle)
3	Thu Jun 27th	2-3 pm	MS / (HS)

Topic

Text-to-audio for song creation

NOTES:

An instrumental-only text-to-audio model is MusicGen, available via Hugging Face or Text to Sample.

Lesson Aims & Objectives:

Build upon what was learned in the MIDI lesson.
Generate songs with AI, but dive deep into the generated structures.
Find what there is to like and dislike about AI-generated songs.

Activities and Tools/Sites/Materials:

Suno (https://suno.com)
Ripple – Music Creation Tool (available on the App Store)
Boomy (https://boomy.com)

TIME LINE (list activities per each 10 minutes):

1. Introduce and present on song form/structure, such as “verse”, “chorus”, etc.
2. Listen to a song. Have students raise their hands to indicate awareness of transitions from verses to choruses.
3. Have students try one of the AI song generation tools listed above.
4. Share back and have them explain what they like and dislike about the AI-generated songs.
5. Have students select one of the generated songs, then pair up to discuss its structure.
6. If time allows, import the generated song into a DAW, and allude to activities that might come next, such as:
    a. Adding lyrics/vocals to an instrumental-only generated track.
    b. Using a stem splitter to isolate different components and/or sample from the generated track.

Lesson W_G

LESSON PLAN

- [x] With AI session
- [ ] No AI session

Week #	Date	Time:	Level (circle)
4	Tue Jul 2nd	2-3 pm	MS / (HS)

Topic	NOTES:
AI in mixing and mastering	Provide a DAW session to students with some unmixed stems.

Lesson Aims & Objectives:

Teach the basics of mixing and editing.
Use AI-powered mixing tools to demonstrate how some tasks can be automated.

Activities and Tools/Sites/Materials:

iZotope Neutron, Ozone, and Neoverb (https://www.izotope.com/en/products.html)
Logic's Mastering Assistant: https://support.apple.com/en-us/108294

TIME LINE (list activities per each 10 minutes):

1. Introduce why mixing is necessary, motivated by listening to an example of pre-mix v post-mix v post-master.
2. Use Neutron or another AI channel strip on a track to show how effects change a sound. If possible, use the analysis features to visualize the changes.
3. Use Neoverb or another AI reverb to show how reverb affects a sound.
4. Students experiment with Neutron, Neoverb, or other effects/mixing plugins in the provided DAW session.

Lesson N_A

LESSON PLAN

☐ With AI session
☐ No AI session

Week #	Date	Time:	Level (circle)
1	Tue Jun 11th	2-3 pm	MS / HS

Topic

Intro class

NOTES:

For this intro class, the With AI/No AI distinction is not relevant; neither particularly is MS/HS.

Lesson Aims & Objectives:

To introduce the program to the students, get to know them, and start teaching the basic lingo and topics of music technology.

Activities and Tools/Sites/Materials:

No special tools needed, mostly getting to know students.

TIME LINE (list activities per each 10 minutes):

1. Introduce students (name, preferred pronouns, musical interests) Will also have a funny question to be determined.
2. Code of conduct explanation
3. Explanation that Creative Studio may have footfall from UM students.
4. Time-zero questionnaire
5. Going over plan for semester.
6. Music tech lingo

Lesson N_B

More work required here to finish PDF -> PPTX conversion of lesson plans.

LESSON PLAN

- [ ] With AI session
- [x] No AI session

Week #	Date	Time:	Level (circle)
1	Thu Jun 13th	2-3 pm	MS / (HS)

Topic

Stems

NOTES:

Low-stakes, fun first audio lesson after intro. Download some multi-tracks in advance (see link below).

Lesson Aims & Objectives:

Learn meaning of the term “stem”.
What are stems, and how they can be used in sampling and mixing.

Activities and Tools/Sites/Materials:

Cambridge Multitrack Library (https://cambridge-mt.com/ms/mtk)

TIME LINE (list activities per each 10 minutes):

1. Introductory slideshow

Lesson N_B orig

LESSON PLAN

☐ With AI session
☒ No AI session

Week #	Date	Time:	Level (circle)
1	6/13/2024	1-2pm	(MS) / HS

Topic **Stems**
- What they are
- How we use them (Mixing & Sampling)

NOTES:
Slated as first lesson after intro. Low stakes, immediate fun with audio.

Lesson Aims & Objectives:
- Tell & Discussion
- Show & Explore
- Creation

Activities and Tools/Sites/Materials:
https://www.cambridge-mt.com/ms/mtk/
Selections to be downloaded from each major genre prior to lesson
Not so many tracks ideal

TIME LINE (list activities per each 10 minutes):

1. Introduction. Slideshow showing DAW's and explaining "timeline" view, what tracks are, and what stems are (minimal semantics)
2. Get students set up in DAW's of their choice. (Logic by default?)
3. Have students load one of several pre downloaded logic projects with cambridge multitracks loaded

At this point it may become wild west for those with enthusiasm. Let kids play with stems at their own pace, but for those who need guidance (in no particular order):

1. Solo one or more tracks, set the loop region and create a 'loop'
2. Start cutting up audio of tracks. Cut out or mute an important part/track, discuss
3. (Advanced): Try syncing the BPM of the DAW to the BPM of the track

Lesson N_C

LESSON PLAN

☐ With AI session
☒ No AI session

Week #	Date	Time:	Level (circle)
2	Tue Jun 18th	2-3 pm	MS / (HS)

Topic

Sound design

NOTES:

Ableton Live and Magenta Studio need to be installed prior to class.

Lesson Aims & Objectives:

Introduce Ableton Live's Session View v Arrangement View.
Use AI to build upon existing melodies or drum tracks.

Activities and Tools/Sites/Materials:

Ableton Live (https://www.ableton.com/en/live)
Magenta Studio (https://magenta.tensorflow.org/studio)

TIME LINE (list activities per each 10 minutes):

1. s

Lesson N_C orig

LESSON PLAN

☐ With AI session
☐ No AI session

Week #	Date	Time:	Level (circle) MS / HS

Topic	NOTES:
sound design	

Lesson Aims & Objectives:

show the basics of sound designing synths, and how to create basic sounds for yourself

Activities and Tools/Sites/Materials:

Vital (free synthesizer)

TIME LINE (list activities per each 10 minutes):

0-10: download vital online and make sure all the students are set up

10-20: describe waveforms, show basic 4 shapes: sine, square, triangle, sawtooth , listen to what they sound like

20-40: describe basic ASDR concepts, filter concepts (should be after the EQ lesson so the students have a basic understanding of frequencies)

40-60: let students experiment with the concepts taught, and go around the room answering questions

Lesson N_D

LESSON PLAN

- [ ] With AI session
- [x] No AI session

Week #	Date	Time:	Level (circle)
2	Thu Jun 20th	2-3 pm	MS / (HS)

Topic

Vocal synthesis and emulation

NOTES:

If students do not have vocals to use, they will be provided with examples from which to choose.

Lesson Aims & Objectives:

Explore the task of text-to-speech for rap generation.
Learn how to turn one voice into another (voice emulation or cloning) utilizing software.

Activities and Tools/Sites/Materials:

Kits AI (https://www.kits.ai/tools/text-to-speech)
Musicfy (https://create.musicfy.lol/create/voice)

TIME LINE (list activities per each 10 minutes):

1. s

Lesson N_D orig

LESSON PLAN

☐ With AI session
☒ No AI session

Week #	Date	Time:	Level (circle)
12	July 18th 2024	2-3 pm	MS / HS

Topic
Voice Cloning/ Recreation

NOTES:
Students will emulate popular artists like Billie Eilish, Britney Spears and Ariana Grande.

Lesson Aims & Objectives:
Students should be able to explain what areas of the frequency range represent in voice and emulate popular artists

Activities and Tools/Sites/Materials:
Students will need headphones, and a DAW loaded up with a vocal and an adjustable EQ plugin.

TIME LINE (list activities per each 10 minutes):

Activity #1: Teach students about vocal EQing, and what the different areas of the frequency range represent, and show examples

Activity #2: Answer questions.

Activity #3: Divide students into artist groups (Group 1: Billie Eilish, Group 2: Britney Spears, etc), and have them listen to isolated vocals and& jot down what unique timbre elements they hear.

Activity #4: Students will take a provided 1 minute vocal sample that sings the desognated artists' song, and they will edit the EQ to make the sample sound more like the respective group

Activity #5: Students will share 30 seconds of their attempt with their group and decide who will present.

Activity #6: 1 representative from each group will present their attempt with the class and show what they did to emulate the artist.

Lesson N_E

LESSON PLAN

- [ ] With AI session
- [x] No AI session

Week #	Date	Time:	Level (circle)
3	Tue Jun 25th	2-3 pm	MS / (HS)

Topic

MIDI beat-making

NOTES:

Cocreate does not require a DAW, but does require an account and email via which to receive results.

Lesson Aims & Objectives:

To teach the basics of Musical Instrument Digital Interface (MIDI).
How to create beats from scratch.

Activities and Tools/Sites/Materials:

Hip hop beats from MAIA Markov on Cocreate (https://cocreate.glitch.me)
SOUNDRAW (https://soundraw.io) if budget allows.
Use DAW of preference.

TIME LINE (list activities per each 10 minutes):

1. s

Lesson N_E orig

LESSON PLAN

☐ With AI session
☒ No AI session

Week #	Date	Time:	Level (circle)
7	Tue Jul 23rd	2-3 pm	MS / HS

Topic	NOTES:
Midi Beat Making	NO AI

Lesson Aims & Objectives:

To teach the basics of MIDI and how to create 'beats' from scratch.

Activities and Tools/Sites/Materials:

Logic, (Possibly FL STUDIO), MIDI Controller

TIME LINE (list activities per each 10 minutes):

1) Brief lesson on MIDI
(what it means, how it works, where it came from, why it is used)
2) Assign groups
Connect MIDI Controller and Open Logic (OR FL Studio)
3) I make my sample beat, showing how I do each part
4) Beat Making pt. 1
1.Beat Making pt. 2
2.Share creations and regroup

Lesson N_F

LESSON PLAN

- [ ] With AI session
- [x] No AI session

Week #	Date	Time:	Level (circle)
3	Thu Jun 27th	2-3 pm	MS / (HS)

Topic

Song creation

NOTES:

An instrumental-only text-to-audio model is MusicGen, available via Hugging Face or Text to Sample.

Lesson Aims & Objectives:

Build upon what was learned in the MIDI lesson.
Generate songs with AI, but dive deep into the generated structures.
Find what there is to like and dislike about AI-generated songs.

Activities and Tools/Sites/Materials:

Suno (https://suno.com)
Ripple – Music Creation Tool (available on the App Store)
Boomy (https://boomy.com)

TIME LINE (list activities per each 10 minutes):

1. s

Lesson N_F orig

LESSON PLAN

☐ With AI session
☒ No AI session

Week #	Date	Time:	Level (circle)
3	6/27/2024	1-2 pm	MS / HS

Topic
Song Creation

NOTES:
This is a music **tech** course. Let's focus on how we can use tech to enhance song creation

Lesson Aims & Objectives:

- Sections and markers in DAWs
- Loop markers
- Copy paste M.E.T.A.

Activities and Tools/Sites/Materials:

Song sectionalities (AABA, ABAC, etc.)
DAW literacy

TIME LINE (list activities per each 10 minutes):

1. Ask students, what makes a song great?
    - hopefully somebody mentions a hook or catchiness
2. Talk structures, use AABA as an example (V. V. Ch. V.)
    - Emphasize that these are just guides, and not formulas for a good song structure
3. Transition to DAW
4. How can we use markers, sections, and simple tools to help us create songs?
5. How can we use automation, effects, samples and complex tools to amplify transitions?
6. Play, show, tell!

Lesson N_G

LESSON PLAN

- [ ] With AI session
- [x] No AI session

Week #	Date	Time:	Level (circle)
4	Tue Jul 2nd	2-3 pm	MS / (HS)

Topic

Mixing and mastering

NOTES:

Provide a DAW session to students with some unmixed stems.

Lesson Aims & Objectives:

Teach the basics of mixing and editing.
Use AI-powered mixing tools to demonstrate how some tasks can be automated.

Activities and Tools/Sites/Materials:

iZotope Neutron, Ozone, and Neoverb (https://www.izotope.com/en/products.html)
Logic's Mastering Assistant: https://support.apple.com/en-us/108294

TIME LINE (list activities per each 10 minutes):

1. Introduce why mixing is necessary, motivated by listening to an example of pre-mix v post-mix v post-master.
2. Use Neutron or another AI channel strip on a track to show how effects change a sound. If possible, use the analysis features to visualize the changes.
3. Use Neoverb or another AI reverb to show how reverb affects a sound.
4. Students experiment with Neutron, Neoverb, or other effects/mixing plugins in the provided DAW session.

Lesson N_G orig

LESSON PLAN

☐ With AI session
☐ No AI session

Week #	Date	Time:	Level (circle) MS / HS

Topic	NOTES:
Mixing and Mastering	

Lesson Aims & Objectives:
Teach the basics of mixing and editing on a fundamental level

Activities and Tools/Sites/Materials:
Use the default EQ, Compressor, and Reverb in the DAW given to learn how to improve an overall mix

TIME LINE (list activities per each 10 minutes):

00-10: Introduce why mixing is necessary and listen to pre-mix vs post-mix vs post-master

10-20: Go over the basics of EQing a sound (listening for resonance and masking)

20-30: Go over the basics of Compressing a sound (focus on dynamic range handling instead of tone shaping

30-40: Go over the basics of reverb

40-60: Leave time for students to experiment with the learned concepts

Change log

v1.1 Initial release

v1.2 Converted some PDF lesson plans to PPTX for ease of adaption by instructors. Added some material and corrected some wording in the Introduction.