

Course Syllabus and Outline for “Music, Sound, and Technology” (Computer Applications)

"Explore the science of sound, the art of music, and the technology that connects them."

Grades 9–12

Semester Elective

Prerequisites: None

Course Description

Music is one of humanity's oldest forms of expression. Technology is one of its newest tools. In this course, students investigate how sound is created, transmitted, recorded, analyzed, and transformed using modern technology. Through daily investigations, engineering notebooks, laboratory activities, digital audio projects, computer applications, and creative design challenges, students discover the connections among music, physics, mathematics, computer science, engineering, and the performing arts.

The Big Questions

Instead of "Course Objectives," students see the questions that will guide the semester.

For example:

- Why does music affect us emotionally?
- What makes one sound different from another?
- How can computers store music?
- Can a computer be creative?
- How does your phone recognize a song?
- Why do concert halls sound different from classrooms?
- How does a guitar string become a Spotify playlist?
- Can mathematics explain beauty?
- How do engineers shape sound?
- What responsibilities come with creating music using AI?

Those questions become the thread that ties the semester together.

Music, Sound, and Technology Laboratory

Class Structure

Everyday class begins this way:

Students have their lab books ready

Lights dim.

Thirty seconds.

One sound.

Nothing else.

Sometimes it's

- whale song
- a violin
- a locomotive
- a jet engine
- rain
- vinyl static
- Morse code
- a sonar ping
- the Voyager Golden Record
- an old telephone
- a bird
- a heartbeat
- your own recording from Medicine Lake
- wind in your Bahia's rigging
- an early computer speech synthesizer
- Apollo mission audio

Students write exactly three things.

I notice...

I wonder...

I predict...

Three minutes.

Science begins with a question. Engineering begins with an observation. Music begins with a sound.

Or simply: Observer, Question, Create.

Components

1. **Course syllabus** (2–3 pages)
2. **Standards crosswalk** (CTE, computer science, NGSS, music)
3. **77-day pacing guide**
4. **Daily lesson plans** (one page each)
5. **Engineering notebook templates**
6. **Lab manual**
7. **Assessment rubrics**
8. **Slide decks**
9. **Teacher demonstration notes**
10. **Student handouts**

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Daily Rhythm

Time Activity

5 min Bell ringer / notebook

10 min Demonstration

15 min Investigation

15 min Computer lab

5 min Reflection

Unit 1 (10 days)

Sound Is Vibration

Questions:

- What is sound?
- Can you see sound?
- Can silence exist?
- Why are some sounds musical?

Labs

- Rubber bands
- Rulers
- Speakers
- Chrome Music Lab
- Oscilloscopes

- Amplifiers
- Saran Wrap

Notebook

Draw waveforms.

Measure frequencies.

Unit 2 (10 days)

Music as Mathematics

Topics

- rhythm
- ratios
- fractions
- tempo
- frequency
- octaves

Students discover

Double frequency

=

One octave

instead of memorizing it.

Unit 3 (12 days)

Digital Audio

Topics

- microphones
- analog

- digital
- sampling
- Nyquist
- bit depth

Labs

Record voices.

Zoom into waveforms.

Find clipping.

Unit 4 (12 days)

Recording and Mixing

BandLab

Signal flow

EQ

Compression

Stereo

Students produce

Podcast

Interview

Music

Unit 5 (10 days)

Programming Music

EarSketch

or

Scratch

Topics

Loops

Functions

Variables

Random numbers

Students write

Algorithmic music.

Unit 6 (10 days)

AI and Music

Topics

Generative AI

Ethics

Copyright

Bias

Deepfakes

Students compare

Human

versus

AI music.

Unit 7 (13 days)

Capstone

Student selected.

Examples

Produce an album.

Compose for a video.

Build a podcast.

Create a game soundtrack.

Analyze classroom acoustics.

Design a virtual instrument.

Daily Rhythm

I think this becomes your signature.

Time Activity

5 min Bell ringer / notebook

10 min Demonstration

15 min Investigation

15 min Computer lab

5 min Reflection

Notice that students are doing something almost continuously.

Optional: Students refine their Capstone project presentation to: Students (especially the Elementary school), parents, and even School Board meeting.

Assessments

- **Engineering Notebook**
- **Lab Reports**
- **Presentations**
- **Peer Review**
- **Listening Analysis**
- **Design Challenges**
- **Portfolio**