**Computer Music Synthesis**

**Computer Music Synthesis** dives into the cutting-edge world of crafting and being sensible to music made with technology. We’ll explore the thrill of sound creation using Ableton Live and the dynamic programming language MaxMSP. From unraveling the techniques and functions of sound synthesis and sampling to learning about signal processing, effects, modulation, mixing, and arrangement—this course is your breakthrough into computer, electronic & digital music insight.

This course offers an overview of the history, theory, and practice of electronic music and sound art. It highlights creativity through hands-on projects, whether you’re composing epic tracks or designing your own sound design identity with Ableton Live, Max MSP and some Logic Pro. We will examine how new technologies have influenced musical ideas, production methods, and cultural developments in the 20th and 21st centuries.

Listening examples will cover a diverse array of styles and genres, including experimental computer music, ambient and dance music, sound art, and multimedia. We’ll explore key concepts and technologies such as microphones, acoustics, synthesizers, deep listening, and controllerism.

**Weekly studio sessions and creative projects will provide hands-on experience with contemporary music production techniques. No prior music experience is needed.**

All the computer stations on the 6th and 8th floor have Live and Max installed and are available for you to use for this class, though many people in the past have preferred to work on their own computers. If you have questions or concerns about purchasing the software, please feel free to contact me.

**Recommended Books**

Holmes, Thom. Electronic and Experimental Music: Technology, Music, and Culture. Fourth Edition. Routledge Press. (recommended)

Demers, Joanna. *Listening Through the Noise: The Aesthetics of Experimental Electronic Music*. New York: Oxford UP, 2010. Print.

Rodgers, Tara. *Pink Noises: Women on Electronic Music and Sound*. Durham: Duke UP, 2010. Print.

Introduction to Computer Music, Hass, Jeffrey. Online: <http://www.indiana.edu/~emusic/etext/toc.shtml>

Cox, Christoph, and Daniel Warner. *Audio Culture: Readings in Modern Music*. New York: Continuum, 2004. Print.

\*keypoints:

 **Computer Music**

 **History of & Production Electronic Music**

 **Function and aesthetics of Sound**

 **Sound Technologies & meaningful creation**

 **Music Technology**

**Schedule & Syllabus**

(subject to revision as needed)

**Week 1 What is Sound? Tone Generators**

Introduction to the course and review of the syllabus + assignments.

Homework - Reading/200=300 word writing response

**Lecture:** Explore the fundamentals of synthesis, starting with sine waves, and learn how to create more complex tones using additive synthesis. You'll also discover how to shape your sound with filters and envelopes, and craft various example sounds, including a synth lead, a lush pad, a drum sound, and a synth bass.

**What is sound, how do we manipulate it?**

**Lab: Tone Generator**

Synth Concepts are a universal Language. It all starts with the sine wave. the envelope section of the amplifier. So this controls the envelope of the analog synth's main output. We also have an envelope here for the filter section. You can see our attack, decay, sustain, and release controls. Amplifier envelope here and our filter envelope here. You notice we have our A, D, S, and R controls which stand again for attack, decay, sustain, and release. So it should be clear just from briefly perusing these there basic synth controls, oscillators, filters, and envelopes, different synth instruments really are alike in a lot of ways. The language of synthesis is universal and it can transcend any platform you work in. And that's my goal. It's to get you comfortable programming any synth you encounter without having to relearn each one.

**Lab: Sine waves**

Audio synthesis can create everything from rich synth beds and screaming leads to realistic instrument emulations. At the core of all synthesis—and all sound—is the simple sine wave, representing a single audio frequency. To understand why sine waves are fundamental, we need to touch on some math, specifically the Fourier Transform. This equation allows us to convert audio from the time domain, where we see sound as a wave over time, to the frequency domain, where sound is represented by its individual sine wave components, or harmonics. Even complex sounds, like a hand clap, can be broken down into a series of sine waves at different frequencies and amplitudes. In the frequency domain, these sine waves appear as spikes on a graph, revealing the "DNA" of the sound. In synthesis, we can reverse this process. By combining multiple sine waves at various frequencies and amplitudes, we can create any sound imaginable—a technique known as Additive Synthesis. In the upcoming sections, we'll explore how additive synthesis is used in some of our favorite synths.

**Assignment: Exploring Basic Synthesis with Oscillators and Sine Waves**

This assignment will introduce you to the fundamentals of synthesis using oscillators and sine waves in Ableton Live. You will create a simple sound using basic synthesis techniques and demonstrate your understanding of these concepts.

**Week 2** **Spinning records**

**& Early Electronic Instruments**

Production Tutorials: Ableton Live Module 1

Homework - Mini-assignment #1

**Lecture: French Electronic Canon music concrete, *Pierre Schaeffer***

How did people create electronic music before the advent of computers, analog synthesizers, and electric guitars? Who were the pioneers who first harnessed the power of electrons to make music, and what drove them to do so? From instruments as large as buildings to mysterious "air" oscillators, we’ll journey through the early days of electronic musical instruments. However, it’s crucial to remember that no machine, despite its complexity, is a magical solution. We must not expect our electronic devices to compose music for us. Just as good and bad music have been created using traditional instruments, the same holds true for electronic music. While computing machines are extraordinary inventions that can seem almost superhuman, they are ultimately limited by the creativity and material we provide them. Similarly, the machines we use to make music can only output what we input.

**Lab: Musique Concrète**, ***Schaeffer, Stockhausen***, using recorded instruments or sounds as the source material for production.

**How has the manipulation of recorded sounds shaped our understanding of music and sound?** Musique concrète and early tape music invite us to reconsider the materiality of sound and the abstract nature of notated music.

"Photography, whether the fact be denied or admitted, has completely upset painting, just as the recording of sound is about to upset music… For all that, traditional music is not denied, any more than the theatre is supplanted by the cinema. Something new is added: a new art of sound. Am I wrong in still calling it music?" – ***Pierre Schaeffer***

*Read Thom Holmes, Chapter 2 (on collaboration).*

**Assignment: Exploring Musique Concrète in Ableton Live**

To introduce students to the concepts of Musique Concrète, as pioneered by Pierre Schaeffer, and explore how these ideas can be applied using Ableton Live. Students will create a piece that manipulates recorded sounds to construct a musical composition, focusing on sound transformation and abstract audio textures.

**Week 3 Tape Music and the European Centers:**

**The French and German schools of thought in electronic music**

Production Tutorials: Ableton Live Module 2

+ Intro to Project 1

Homework - Project 1 + Reading/200=300 word writing response

**Lecture:** Phonogram, recorded music, sampling: How did people create electronic music before the advent of computers, analog synthesizers, and electric guitars? Who were the pioneers who first harnessed the power of electrons to make music, and what drove them to do so? From instruments as large as buildings to mysterious "air" oscillators, we’ll journey through the early days of electronic musical instruments. However, it’s crucial to remember that no machine, despite its complexity, is a magical solution. We must not expect our electronic devices to compose music for us. Just as good and bad music have been created using traditional instruments, the same holds true for electronic music.

**Lab: The French and German schools of thought in electronic music represent two distinct approaches:** the French, epitomized by pioneers like Pierre Schaeffer, focuses on musique concrète, emphasizing the manipulation of recorded sounds and treating sound itself as the primary material. In contrast, the German school, with figures such as Karlheinz Stockhausen and Kraftwerk, is characterized by its emphasis on synthesizers and electronic instruments to generate and manipulate sounds, leading to innovations in electronic composition and technology. While the French approach centers on artistic transformation of existing sounds, the German approach prioritizes technological advancement and the creation of new electronic soundscapes.

**Assignment: Exploring Audio Synthesis and Personal Aesthetics in Music Production**

This assignment invites you to delve into audio synthesis to create a composition that mirrors your personal musical tastes and aesthetic preferences. You'll use sound design techniques to develop three distinct sounds in Ableton Live, then incorporate these sounds into a 1-2 minute composition within your chosen genre.

**Week 4 Synthesizers**

Production Tutorials: Ableton Live Module 3

including Wavetable, Simpler/Sampler, EFX, Types of synthesis, Oscillators, additive, subtractive,

Homework - Mini-assignment #2

**Lecture:** How do analog synthesizers work? In this session, we'll explore the world of analog synthesis and the groundbreaking music it inspired. We'll break down the essential parts of a modular synthesizer, such as VCOs, VCFs, envelopes, and LFOs. We'll also discuss how pioneers like Wendy Carlos and Isao Tomita brought the Moog synthesizer to fame with their classical music renditions. The Minimoog, the first portable synth, became a key instrument for artists like Keith Emerson, Yes, Kraftwerk, Pink Floyd, and many others. To wrap up, our resident synth expert, Travis Thatcher, will give us a live demonstration of the Minimoog in action.

**Assignment:** **Building complex tones with additive synthesis**

Use additive synthesis to combine simple sine waves and create more complex tones.

In this assignment, you will explore additive synthesis by combining simple sine waves to create more complex tones. Starting with a basic sine wave, which lacks harmonics, you’ll follow specific recipes to build richer sounds like square, triangle, and sawtooth waves. For example, a square wave is created by adding sine waves with odd multiples of the fundamental frequency, each at decreasing amplitudes (e.g., 100 Hz, 300 Hz at 1/3 amplitude, etc.). As more sine waves are added, the combined waveform increasingly resembles the target waveform, resulting in a complex tone with rich harmonics. Understanding these harmonic structures is crucial for grasping the basics of sound synthesis and how synths generate these tones.

**Week 5 The institutionalization of the Musical van-guard**

Production Tutorials: Ableton Live Module 4

Intro to Max MSP, Max MSP Module 1

+ in class Project 1 check-in

Homework - Project 1 + Reading/200=300 word writing response

**Lecture:** Ircam GRAM label- examples IRCAM (Institut de Recherche et Coordination Acoustique/Musique) is a prominent French institute dedicated to the research and development of music and sound technologies. Founded in 1977 by the avant-garde composer ***Pierre Boulez,*** IRCAM is located in Paris, near the Centre Pompidou, and is known for its pioneering work in the fields of electronic music, computer music, and acoustics.

**Key Aspects of IRCAM:**

<https://inagrm.com/en>

<https://inagrm.com/en/store>

<https://kalimalone.bandcamp.com/album/living-torch>

**Lab: Introduction to Max/MSP**

Max/MSP is a visual programming environment used for creating music and sound design. **Max** handles logic and interface, while **MSP** focuses on real-time audio processing. By connecting graphical objects, you can build custom synths, effects, and interactive projects, making it a versatile tool for composers and sound artists.

**Assignment: Exploring Basic Synthesis with Oscillators and Sine Waves in Max/MSP**

This assignment introduces you to the basics of synthesis in Max/MSP using oscillators and sine waves. You will design simple sounds, experiment with basic synthesis techniques, and understand how different parameters affect sound creation.

**Week 6 Indeterminacy, Generative and Improvisation in Live Electronic Music**

Production Tutorials: Ableton Live Module 5

Max MSP Module 2

How to listen to people’s tracks and give feedback. How to ask for the feedback you

want + Project 1 Crit

**Lecture:** Indeterminacy and improvisation in live electronic music refer to the elements of unpredictability and spontaneity in performances. Indeterminacy involves incorporating chance or randomness into the music-making process, often using generative algorithms, random control parameters, or unpredictable sources of sound. This approach allows for unique, ever-changing results that can't be fully premeditated. Improvisation, on the other hand, emphasizes real-time creativity and decision-making by the performer. In live electronic music, this might involve manipulating live sound inputs, adjusting synthesis parameters, or interacting with software in ways that are intuitive and responsive to the moment. Together, indeterminacy and improvisation create dynamic, evolving performances where the final outcome is shaped by both structured elements and spontaneous actions.

**Lab:** **Max MSP as pre/post electronica formats: unique systems of composition &/- indeterminacy. *Henry Cowell, Carlos Chavez, John Cage.***

How do John Cage’s theories of indeterminacy and chance operations influence the performance of electronic music? What does it mean to "play the laptop"? How can live electronic musicians connect with their audience? We’ll explore how the American Avant-Garde, improvisation, and emerging technologies inspire new ideas about what it means to be a composer, performer, and instrument creator in the realm of live electronic music.

**Assignment: Exploring Generative Music in Max/MSP**

This assignment focuses on creating generative music using Max/MSP. You will design a patch that generates evolving musical patterns or textures, exploring the principles of randomness, algorithmic composition, and generative processes.

Project 1 Crit

**Week 7 Timbre and Noise.**

Production Tutorials: Ableton Live Module 6

+ Max MSP Module 2, including enriching with low-frequency oscillators (LFOs) & Frequency Modulation (FM)

Homework - Project 2 - Collaborative Project + Reading/200=300 word writing response

**Lecture: Timbre & Noise.** Beyond amplitude (loudness) and frequency (pitch), there is another, more elusive characteristic of sound known as timbre. Timbre, or tone color, is the quality of a sound that distinguishes it from others, even when pitch and loudness are identical. It is shaped by factors like harmonics, the sound's envelope (attack, decay, sustain, release), and its spectral content. Timbre is often perceived as the quality or texture of a sound, influenced by its spectral content or overtones, as well as its durational features, such as the sound's envelope (attack and decay).

Another factor affecting timbre is noise—those unpredictable, aperiodic fluctuations within a sound. Noise is characterized by a broad range of frequencies without a clear pitch and includes types like white noise (evenly distributed frequencies), pink noise (equal energy per octave), and brown noise (more low-frequency energy). In computer music, understanding timbre allows for the creation and differentiation of unique sounds, while noise can be used for texture, sound masking, or experimental purposes. In 1913, Italian Futurist composer Luigi Russolo famously explored the concept of noise in his manifesto, The Art of Noise.

Read The Art of Noise by Luigi Russolo.

**Lab: Working with Oscillators**

we'll examine sine, square, triangle, and sawtooth waveforms found in popular synths.

Starting with Logic Pro's Retro Synth, both oscillators are set to sawtooth waves. To enhance the sound, detune one oscillator by 20 cents for a richer effect. Experiment with intervals, like raising one oscillator by five semitones, and switch waveforms to add variety. We’ll also explore these techniques in Ableton’s Analog Instrument, adjusting octave, semitone, detune, and waveform shape for diverse sounds.

This concludes our additive synthesis section. Next, we’ll explore subtractive synthesis, focusing on filters and envelopes to further shape these sounds.

**Week 8 Learning drum programming**

Production Tutorials: Ableton Live Module 7, drum racks in Ableton

+ Max MSP Module 3

**Lab: Digital Sampling and Drum Machines & Drum racks on Ableton Live**

**Assignment Drum Racks:** In this assignment, you will create custom drum sets using Ableton Live's Drum Rack. Start by loading a Drum Rack onto a track and triggering the pads with a MIDI keyboard. Next, drag samples like kicks and snares onto the pads, adjusting settings such as start/end points for each sample using the Simpler instrument. Continue adding and arranging samples on other pads as needed. To enhance your sounds, apply effects like EQs and compressors to individual chains or the entire rack. Finally, organize and save your drum rack as a preset for future use. This process offers extensive control and flexibility for your drum sounds. Create custom drum sets by mapping samples to pads, allowing for independent triggering and processing.

**Week 9 Spectral Music**

Production Tutorial: Introduction Logic Pro, Ableton Live Module 8: Exploring Filters + in class work session

Homework - Project 2 - Collaborative Project + Reading/200=300 word writing response

**Lecture:** We will explore how composers use spectral information to create and perform new music, starting with an analysis of techniques pioneered by French "Spectral" composers like Gérard Grisey and Tristan Murail. Our discussion will focus on Grisey’s piece Partiels, examining how emerging computer technologies in the mid-1970s influenced the compositional approaches within the French Spectral movement.

**Lab:** **Analyzing its contents using Fourier analysis, transcribing harmonic partials, and additively "re-synthesizing"** the trombone’s spectrum with a live. In addition to the piece’s overtly spectral characteristics, we will explore how the analysis of sound spectra—particularly intervals found high in the harmonic series—can inform the creation of new tuning systems and scales. While intervals lower in the harmonic series form the basis of familiar scales and chords, those found higher in the series often represent significant deviations from these structures, introducing what we refer to as "microtones."

**Tutorial: Exploring Filters, Sculpting sound with envelopes. Understanding Synth Filters**. Filters in synthesis work by removing certain frequencies, similar to how equalizers adjust sound. Synth filters are essential tools in sound design, shaping sounds by removing or emphasizing specific frequencies, much like an equalizer. There are several types of filters: a Low Pass Filter (LPF) allows low frequencies to pass while cutting high frequencies, with the cutoff frequency determining the range and resonance adding emphasis around it. A High Pass Filter (HPF) does the opposite, cutting low frequencies. Band Pass Filters (BPF) allow a specific range of frequencies through, while Band Reject (Notch) Filters cut a particular range. A Peak Filter boosts a specific frequency range. Mastering the use of filters, including adjusting cutoff and resonance, is key to creating dynamic and expressive sounds.

**Week 10 Ambient Music**

Project 2 Crit

Homework - Project 3 + Reading/200-300 writing response

**Lecture:** An ambiance refers to an atmosphere or a surrounding influence, a kind of tint. My goal is to create original pieces—primarily but not exclusively—for specific times and settings, aiming to develop a diverse yet adaptable collection of environmental music that suits various moods and atmospheres. — Brian Eno

We will start by exploring Satie’s concept of "Furniture Music" and trace the evolution of ambient music through the 20th century. This journey will include a look at composers whose work navigates the space between foreground and background, expression and function. For instance, Wendy Carlos blended field recordings with synthesizer sounds in *Sonic Seasonings*, while Tangerine Dream created long, evolving synthesized soundscapes in the early 70s. In 1978, Brian Eno coined the term "Ambient Music" to describe his influential album *Music for Airports*.

**Lab: Making a rich pad, layering, Sound Design, Concepts. Tutorial: Making a rich pad**

Think of a bed of sound for your song to develop over. This is traditionally called a pad, in synth speak. In this tutorial, we'll use Logic Pro X's Retro synth (Table skin) to craft a rich pad sound, which serves as a bed of sound for your song. A key to a good pad is a slow, evolving texture. Start by adjusting the amplifier envelope to lengthen the attack time to about 1200ms, allowing each note to fade in slowly. Also, increase the release value so notes linger after being released. Next, tweak the filter envelope to gradually open the filter over time, adding depth to the sound. Adjust the oscillators by pitching one down by five semitones and slightly detuning it for a fuller tone. Finally, introduce motion by connecting an LFO to the filter, creating a shimmer effect. Sync the LFO to your song’s tempo for better alignment. Listen to your pad in the context of the song, making any necessary adjustments to fit the overall mood.

**Assignment: Exploring Generative Music with Ableton Live and Max for Live**

This assignment focuses on creating generative music using Ableton Live in conjunction with Max for Live. You will design a generative system that creates evolving musical patterns and textures, exploring principles of randomness, algorithmic composition, and generative processes.

**Week 11 Sequencing and Automation:**

Production Tutorial: Ableton Live Module 9: Sequencing and Automation

More Ableton Live + in class work session + Introduction to Project 3 + In class work

session

Homework - Project 3 + Reading/200-300 writing response

**Lecture:** Sequencing and automation are essential tools in modern music production, allowing for precise control over the timing and dynamics of musical elements. Sequencing involves arranging notes and events on a timeline, enabling the creation of complex musical patterns, rhythms, and melodies. This technique has transformed how music is composed and produced, especially in electronic music, where intricate patterns and repetitive loops are fundamental.

Automation, on the other hand, allows for the real-time control of various parameters within a digital audio workstation (DAW). By automating volume, panning, effects, and other controls, you can add movement, variation, and expressiveness to your music. These techniques allow producers to shape their sound in detailed and dynamic ways, often resulting in more polished and professional tracks.

In this class, we'll dive into the fundamentals of sequencing and automation, exploring how to use these tools effectively to enhance your compositions and bring your musical ideas to life.

**Lab:** "I automate everything that can be automated to free myself to concentrate on the aspects of music that can’t be automated. The challenge is determining which is which." — **Laurie Spiegel. Laurie Spiegel is celebrated for her early use of computers in music composition.** Her work in the 1970s and 1980s with the GROOVE (Generated Real-time Operations On Voltage-controlled Equipment) system, a hybrid analog-digital synthesizer developed at Bell Labs, is particularly noteworthy. This system allowed her to sequence and automate musical elements in ways that were not possible with traditional instruments. **"The Expanding Universe" (1980): Spiegel's album The Expanding Universe is a landmark in electronic music. It showcases her ability to create complex, layered compositions using sequencers and early computer technology. The album is a testament to how sequencing and automation can be used to craft intricate and evolving soundscapes.**

Hardware sequencers allow musicians to step away from their instruments, enabling them to listen, adjust their sounds, and explore the "aesthetics of the machine." Today, we’ll delve into various techniques for sequencing and automating sounds.

**Assignment: Sequencing and Automation in Ableton Live** Create a short composition in Ableton Live that demonstrates your understanding of sequencing and automation. This project will allow you to explore how to structure a musical idea and bring it to life using automation to enhance dynamics, movement, and expressiveness.

1. **Create a Basic Sequence:**
2. **Add Automation to Your Sequence:**
3. **Experiment with Different Types of Automation:**
4. **Arrange Your Sequence:**
5. **Export and Submit:**

**Week 12 Digital Audio and Early Computer Music**

Project 3 check in + in class work session, making a synth lead, making a Synth bass

Homework - Project 3 + Reading/200-300 writing response

**Lecture:** Digital audio and early computer music represent the foundation of modern electronic music. The transition from analog to digital technology enabled more precise control over sound, leading to innovations that shaped the music we hear today. Early computer music emerged in the mid-20th century, with pioneers using computers to generate sound through algorithms and digital synthesis. This era saw the development of key concepts like sampling, sound synthesis, and the use of mathematical models to create music. These innovations opened the door to new creative possibilities, influencing genres and techniques that continue to evolve in contemporary music production. This introduction will explore the fundamental principles of digital audio, the historical context of early computer music, and the significant impact these technologies have had on the evolution of music.

**Lab: Making new Sounds:**

**Tutorial: Making a synth lead** In this tutorial, you'll learn how to create a lead synth using Logic Pro X's Retro Synth. Start by setting the polyphony to monophonic for a cleaner melody, as lead synths often benefit from playing one note at a time. Configure the oscillators by selecting a sawtooth wave for oscillator one and blending in a square wave on oscillator two, slightly detuning it for a richer sound. To add movement, link an LFO to the filter, syncing it to the song's tempo with a triangle wave. Lastly, enable glide for smooth transitions between notes, giving your lead a classic Moog-style feel.

**Week 13 Sampling**

Introduction to Ableton Live

Project 3 check in + in class work session

Homework - Project 3 + Reading/200-300 writing response

**Lecture:** Sampling is a foundational technique in computer music where segments of audio, known as "samples," are captured from existing recordings and repurposed in new musical contexts. These samples can range from short sound bites, like drum hits, to longer phrases or entire sections of a song. In a computer music setting, sampling allows composers and producers to manipulate these audio fragments—changing their pitch, tempo, or applying effects—to create entirely new sounds or compositions. This technique has revolutionized music production, enabling artists to blend diverse sounds, genres, and cultural references into innovative and creative works.

**Lab:** **“**Human culture is inherently derivative, and music is perhaps the most so. We listen to music, interpret it, reconfigure it, and produce something that is both derivative and innovative.” (Keller) Sampling and remixing are methods of creating new music from existing material. While these techniques have existed as long as music itself, digital sampling represents a new level of capability. Today, we’ll explore the history and experimental practices of cut-ups, remixes, and mash-ups across various genres—hip hop, experimental, and pop.

**Assignment: Exploring Sampling in Computer Music Synthesis**

In this assignment, you'll explore sampling in computer music synthesis by creating a unique composition using various techniques in a DAW like Ableton Live or Logic Pro X. You'll start by sourcing and editing at least three different sound samples, then experiment with time-stretching, pitch-shifting, and slicing to transform them. Next, you'll layer these samples with synthesized sounds, apply effects, and use a sampler instrument to create melodic or harmonic elements. Finally, you'll arrange your samples into a short composition and document your process in a brief report, detailing the techniques and creative decisions you made.

**Week 14 Sound & Image**

Project 3(Final) Crit

**Lecture:** How do visual elements and non-audio components enhance the musical experience? Factors such as videos, films, memes, subcultures, genres, branding, myths, platforms, and dance all influence how we perceive and connect with music, even beyond the sound itself. In an era dominated by the internet, social media, and current events, how has sound become intertwined with all aspects of our lives, and vice versa? Is this integration a novel phenomenon driven by technology, or has it been a constant throughout history?

**Week 15 Sound Art & Sound Installation**

Project 3(Final) Crit

**Lecture:** Sound as the Medium: In Sound Art, the primary focus is on sound itself. Artists use sound not just as a component but as the main subject and material of their work. Intermedial Nature: Sound Art doesn’t conform to traditional categories. For instance, while music might involve structured compositions and performance, Sound Art might use sound in ways that intersect with visual art, installations, or other forms.