CEGU 24502 **(ENST 24502/MUSI 24502/MADD 20502/ARCH 25402/CHST 24502)**
Sound & Environment
Carlo Diaz

Spring 2025
Tuesdays, 11:00am–12:20pm, Logan Center 028
Thursdays, 11:00am–12:20pm, Logan Center 802

Description

Huge sections of the Earth's crust resonate across hundreds of miles: seismology, infrasound. Fish larvae differentiate tiny vibrations in ocean water produced by diverse coral ecosystems: hydroacoustics, ultrasound. Humans gather in large numbers to watch each other carefully manipulate air pressure: music, architecture, psychoacoustics. Each of these phenomena can be understood to fit within the field of sound studies, and each among many further examples has an effect upon each other, contributing to a delicately interlinked planetary system of pressure, vibration, and resonance within air, water, land, and body. This system is now in crisis. From the most densely populated cities to the remotest nature preserves and industrial hinterlands, the extraction, processing, transportation, and consumption of natural resources by humans interferes with delicate systems of sounding and listening essential to almost all forms of life on Earth. How can sound studies and audio technology help us navigate this moment?

This course takes students of environment, geography, and urbanization through a survey of sound studies and audio technology, from physics, electronics, hearing, and psychoacoustics to the aesthetics, politics, and poetics of musical and non-musical sound production. Foci include acoustic ecology, deep listening, field recording, and sound mapping; infrasonics and ultrasonics; human and non-human listening; seismographic, atmospheric, and underwater acoustics; urban noise, acoustic construction, and human health; sound and historical time; music and naturalism; data sonification; and the auditory aesthetics of combustion and electricity. Students will also learn the basics of acoustic recording, audio processing, and data sonification through hands-on workshops and collaborative projects.

Learning Outcomes

By the end of the course, students will:
- have improved their awareness of the impact of sound on the non-human
- have improved their ability to listen deeply to the sounds around them
- understand the complexities of reproducing auditory experience in digital media
- understand basic physical principles relating to sound and (psycho)acoustics
- understand basic electrical and digital principles relating to audio production
- be able to make high-quality audio recordings in a range of acoustic environments
- be able to to focus listener attention toward particular aspects of a recorded sound

Course Technology

Recording: Each student will receive a portable audio recorder for use throughout the duration of the quarter. All recordings should be made using this device. Any students with significant prior experience in audio production are welcome to use more advanced recording equipment, but should speak with me during Week 1 to discuss details.

Processing: All editing and processing of audio should be done in Reaper, which offers a generously long free trial period (60+ days) or can be purchased outright for $60 (discounted license). You will of course also need access to a computer (running Mac OS, Windows, or Linux; *not Chrome OS, Android, or iPadOS*). Any students with signficant prior experience in audio production who are well-acquainted with a different DAW may contact me in Week 1 to discuss whether it will suffice for this class. For a few examples, Adobe Audition, Avid ProTools, and Logic Pro will suffice, but Audacity and Garage Band will not.

Logan Media Center: Students are encouraged to make use of audio editing workstations and audio equipment checkout at the Logan Media Center.

Access to the Media Center (that's both gear and any spaces, including the edit suites and computer lab) will require a few steps. These are necessary for all users of the Media Center, even if you've been a frequent user in the past. We find that enough changes from year to year that a quick refresher keeps everyone up to date and makes sure that we're all on the same page. The steps to access are as follows:

- First, please fill out this Google Form so we can capture a little information about you and what you are working on. Again, please fill this out again even if you did this in past years.
- Next, we will add you to our Media Center Canvas course where you will find a bunch of information, including some new and updated orientation videos. Please take a look around the Canvas page if this is your first time as many questions can be answered here, including the information for...
- Our new 2024/2025 General Access Quiz which everyone must pass before we can give you access to the Media Center. This is similar to last year but please use this quiz to refresh your memory on how we run things in the JLMC.
- From here, we'll do our best to onboard people into the Media Center in a timely manner and get you setup for both access to borrow items from the Cage as well as get into the computer lab and edit suites. Please be patient as this can take a day or two; this is a manual process. Do not expect to walk right up to the Cage the moment you have completed the quiz.

That's it! From there you'll be able to begin using the Media Center and have access to roughly 90% of the inventory in the Cage. The easiest way to view what we have and make a reservation is to use our Patron Portal. This will allow you access to browse gear by type, search and make advanced reservations. Please note, that while you may

be able to log in here with your uchicago CNET, **you will not be able to reserve items until we have processed your Canvas quiz.**

You should also be able to use the Robin App to make reservations for the edit suites. While this works okay in a browser, it's even easier to use the mobile phone app.

If you have any other questions about the Logan Media Center, please contact loganmediacenter@uchicago.edu.

Projects

Over the nine weeks of class each student will complete three field recording projects. A basic portable audio recording kit will be provided to each student for the duration of the quarter. The goal of each assignment will be unique, but students will be encouraged to regularly 'gather' audio materials around town throughout the duration of the course and to develop effective organizating and cataloging techniques for their own personal auditory database. Final editing and mixing for each project will need to be done on personal computers or in the Logan Media Center, and each project submission must also include a short artist statement or program note describing the piece.

Project 1: Field Recording (due Week 3, Monday evening) (20% of final grade)

Prompt: Produce a field recording.

Goals: The goal of this project is simply to make a start at producing field recordings. Audio production equipment can be diverse and complex, so this will be a low-stakes way to get acquainted with the core tools and processes involved.

Guidelines: Ideally this should *not* be music or spoken word but some type of ambient, environmental, industrial, mechanical, or natural sound or soundscape, and should be approximately five minutes long. It will be best if you actually record for significantly longer than five minutes and then trim your audio down to the five-minute goal duration so that you can shape the sound with intention. Once you have your five minutes selected, apply some basic processing as necessary to optimize the frequency spectrum, dynamic range, and loudness.

Submission: Please submit your final audio file (48kHz/24-bit .wav) along with a ~250 word artist statement/program note:
- identifying your recording conditions (location, date, time, weather, significant events or activities, etc.),
- describing your recording and editing process,
- describing the audible sounds involved,

- describing the difference between the live and recorded experience of this soundscape.

Project 2: Sound Map (due Week 6, Monday evening) (40% of final grade)

Prompt: Following Annea Lockwood's lead, produce a sound map presenting any significant geographical characteristic of Chicago through auditory media.

Goals: This project has both technological and conceptual goals. Technologically, it's an opportunity to dig deeper into combining audio recorded in disparate moments and locations, thus producing a virtual sense of auditory space through editing, panning, and spatialization. Conceptually, it will allow us to make a start at thinking critically about the spatial and temporal compression inherent in audio production as well as where broad trends in urban planning, infrastructure, resource flows, conservation, socioeconomics, and culture may or may not be possible to hear or amplify out of broader environmental soundscapes.

Guidelines: The first step for this project will be to brainstorm the region, scale, and object of your map (keeping in mind that you only have a few weeks). Are you interested in train movement through McKinley Park or birdsong along the Uptown lakeshore? Or is your focus is even smaller, like an audio floor plan of Harold Washington Library? Once you decide on this, write a list of specific locations, times of day, and/or events to capture, and perhaps a list of sounds you anticipate hearing or would like to hear. Then go out and record (always remembering to make detailed file names and notes)! Once you've built up a little database of audio materials, move into your DAW and start to edit. How will you compress spaces larger than a single earshot—temporally, spatially, or a combination of the two? How will you focus in on the features most important to you—filtering, gating, compression? For duration, aim for anywhere between 5–20 minutes.

Submission: Please submit your final audio file (48kHz/24-bit .wav) along with a detailed list of recording locations/conditions and an artist statement/program note of up to 1000 words:

- describing how the sequence of events in your audio correspond to the various actual dates/times, locations, or events recorded;
- identifying your goals for the map—What are you mapping, and what unique perspective on this field do we gain through its mapping in sound?

If you prefer, you may instead produce a more visual presentation of the artist statement/program note (I'm thinking of the liner notes from the Annea Lockwood CD, for example). If you go this route, please still keep the length of the more interpretive text(s) to 1,000 words or fewer, and still address the same points listed above.

Project 3: Audible Inaudible (due Finals Week, Monday evening) (40% of final grade)

Prompt: Make audible what cannot be heard.

Goals: This project is an opportunity to dig deeper into an area of sound studies that's of most interest to you. The outcome will vary from project to project—try something new!

Guidelines: The prompt is intentionally quite broad, but asks you to focus in on something that can't simply be recorded 'neutrally.' This can be a historical soundscape produced by a culture, practice, or technology that no longer exists; it can be a (u-/dys-)topian soundscape representing some kind of future technological, political, or cultural transformation; or it can be a data sonification project, where real sound or vibration beyond the realm of typical human audibility is somehow translated into an analogous audible phenomenon. Use your imagination!

Submission:

By Monday of Week 8, please submit a (roughly) 500-word proposal detailing:
- your intended focus (what inaudibility will you confront?)
- your plan for making recordings (What types of sounds will you need? When and where will you collect them, and how much/many of them will you need?)
- your plan for processing and/or organizing your recordings

By Monday of Finals Week, please submit your full project, including:
- a project title
- your final .wav file(s) in 48 kHz / 24 bit
- a (roughly) 1000-word program note describing and/or contextualizing the project for a general audience (think of this as liner notes for an album or wall text in a gallery; and feel free to include photos, maps, and/or other visualizations if relevant)

Timeline

Week 1 **acoustic ecology and deep listening**

reading/listening

- John Cage, “The Future of Music: Credo,” “Experimental Music,” and “Experimental Music: Doctrine” in *Silence* (Middletown, CT: Wesleyan University Press, 1961), 3–17.

- Luigi Russolo, *The Art of Noises*, trans. Barclay Brown (Hillsdale, NY: Pendragon Press, 1986), 23–30.

- R. Murray Schafer, “The Rural Soundscape,” “From Town to City,” and “The Industrial Revolution” in *The Soundscape: Our Sonic Environment and the Tuning of the World* (Rochester, VT: Destiny Books, 1977), 43–87.

Tuesday—**introductions, overview, and basic physics of sound**

Thursday—**introduction to field recording and audio editing + conversation with Prof. Niall Atkinson (Art History + CEGU)**

Saturday, 3:30–7pm (optional)—**Bridgeport Soundwalk**

- We will meet at Base Community Cafe, Bridgeport Art Center (1200 W. 35th St.), walk north to Park No. 571, and then return back down to the Bridgeport Art Center. Please bring your field recording kit (including a full set or two of batteries) and wear weather-appropriate clothing as well as good shoes for walking. Please also bring a smartphone with Strava installed and set up.

Week 2 **field recording, sound maps, and the artificiality of audio**

reading/listening

- Annea Lockwood, *Sound Map of the Hudson River* (1982).

- Francisco Lopez, *La Selva* (1997).

- Heiner Goebbels, “The Trees” in *Stifters Dinge* (2012).

- Francisco Lopez, “Environmental Sound Matter” (1998).

- Pierre Schaeffer, “Acousmatics” in *Treatise on Musical Objects: An Essay across Disciplines*, trans. Christine North and John Dack (1966), 64–72.

- Joeri Bruyninckx, “Sound Sterile: Making Scientific Field Recordings in Ornithology” in *The Oxford Handbook of Sound Studies* (2012), 127–150.

Tuesday—**theory and practice of field recording**

Thursday—**sound maps and audio spatialization**

Week 3 **sound and the human**

reading/listening

- David M. Howard and James A. S. Angus, “Introduction to Hearing” in *Acoustics and Psychoacoustics* (New York: Routledge, 2017).

- Kelly Ladd, “Bad Vibrations: Infrasound, Sonic Hauntings, and Imperceptible Politics” in *The Acoustic City* (Berlin: Jovis, 2014), 193–200.

- Mara Mills, “Do Signals Have Politics? Inscribing Abilities in Cochlear Implants” in *Oxford Handbook of Sound Studies* (Oxford: Oxford University Press, 2012), 320–346.

Tuesday—**group listening critique to Project 1: Field Recording**

Thursday—**human hearing and psychoacoustics**

Week 4 **sound and the non-human**

reading/listening

- Norma and Jerry Stillwell, *Bird Songs of Dooryard, Field and Forest, Vol. 2* (1953).

- Roger Payne, *Songs of the Humpback Whale* (1972).

- Karen Bakker, “The Singing Ocean” and “Reef Lullaby” in *The Sounds of Life: How Digital Technology is Bringing Us Closer to the Worlds of Animals and Plants* (Princeton: Princeton University Press, 2022), 27–43 & 80–98.

- Christopher Clauser, “Earthquakes and Earth’s Structure” in *Introduction to Geophysics* (London: Springer Nature, 2024), 56–62.

- Lapo Boschi, “The Vibrations of the Earth” in *Our Concept of the Earth* (London: Springer Nature, 2024), 155–165.

- Jake Hays, Michael McCawley, and Seth B. C. Shonkoff, “Public health implications of environmental noise associated with unconventional oil and gas development” in *Science of the Total Environment* 580 (2017), 448–456.

Tuesday—***The Sounds of Life*: sonic, infrasonic, ultrasonic**

Thursday—**the sounds larger than life: seismology and resonant earth**

Week 5 **noise, health, and acoustic construction in an urban world**

reading/listening

- Xue Zhang, Suhong Zhou, Mei-Po Kwan, Lingling Su, and Junwen Lu, “Geographic Ecological Momentary Assessment (GEMA) of Environmental Noise Annoyance: The Influence of Activity Context and the Daily Acoustic Environment” in *International Journal of Health Geographics* 19, 50 (2020)

- Omar Hahad, Marin Kuntic, Sadeer Al-Kindi, Ivana Kuntic, Donya Gilan, Katja Petrowski, Andreas Daiber, and Thomas Münzel, “Noise and Mental Health: Evidence, Mechanisms, and Consequences” in *Journal of Exposure Science & Environmental Epidemiology* 35 (2025), 16–23.

- David Miles Huber, “Studio Acoustics and Design” in *Modern Recording Techniques* (2018), 75–103.

- US Title 40, Vol. 27, Chapter I, Subchapter G - Noise Abatement Programs

- Illinois 415 ILCS 5 - Environmental Protection Act, Title VI: Noise

- Illinois 625 ILCS 5/12-602 – Mufflers, prevention of noise

- Illinois 625 ILCS 5/12-602.1 – Excessive engine braking noise signs

- Chicago 8-32 – Noise and Vibration Control

- Chicago Department of Aviation – O'Hare Noise Management
- Chicago Department of Aviation – Midway Noise Management
- LEED v4.1 Residential Multifamily Home Guide – Acoustic Performance

Tuesday—**urban noise and human health, with Prof. Laura McGuinn (Family Medicine + CEGU)**

Thursday—**acoustic construction and noise abatement**

Week 6 **data sonification as practice**

reading/listening

- Sonification of a Hubble Deep Space Image (NASA)
- Sonification of the Bubble Nebula (NASA)
- 5,000 Exoplanets: Listen to the Sounds of Discovery (NASA)
- Mads G. Christensen, "Introduction to Pure Data" in *Introduction to Audio Processing* (London: Springer Nature, 2019), 193–220.

Tuesday—**group listening critique to Project 2: Sound Map**

Thursday—**audio as data, part 1**

Week 7 **data sonification as knowledge**

reading/listening

- Hans-Jörg Rheinberger, "Transpositions: From Traces through Data to Models and Simulations" in *Transpositions: Aesthetico-Epistemic Operators in Artistic Research* (2018), 215–224.
- Pierre Schaeffer, "Morphology of Sound Objects" and "The Laboratory" in *Treatise on Musical Objects: An Essay across Disciplines*, trans. Christine North and John Dack (1966), 309–320 & 321–339.

Tuesday—**audio as data, part 2**

Thursday—**transpositions**

Week 8 **artistic research, historical sound**

reading/listening

- Henk Borgdorff, “The Production of Knowledge in Artistic Research” in *The Conflict of the Faculties: Perspectives on Artistic Research and Academia* (2012), 141–173.

- Niall Atkinson, “The Acoustic Art of City Building” in *The Noisy Renaissance: Sound, Architecture, and Florentine Urban Life*, 38–68.

Tuesday—**artistic research and sound practices**

Thursday—**Soundscapes of the Early Modern City, with Prof. Niall Atkinson (Art History + CEGU)**

Week 9 **sound judgment**

reading/listening

- Linda Phyllis Austern, “”Comforable…in Sicknes and in Health:” Music to Temper Self and Surroudnings” in *Both from the Ears and Mind: Thinking about Music in Early Modern England* (2020), 217–247.

- John F. M. Dovaston, “Three Popular Lectures, One on Natural History and Two on National Melody” (1839).

Tuesday—**problems of sound historiography**

Thursday—**singing in the aviary**

Final **group listening critique to Project 3: Audible Inaudible**