

Cooking With Sound

Syllabus Fall 2012

Ted Hayes

What is it about the propagation of compressed air waves that gives rise to such a vast panoply of history, culture, ideas and artworks? What exactly does sound consist of, and how can we use (and abuse) it? Utilizing sound in our projects is a lot like cooking: we find and make ingredients, manipulate them, mix them together, bake at 400°, serve. *Cooking With Sound* explores the phenomenon of sound from the ground up, investigates its history, practice and potential as a medium for art, communication, and pleasure, and provides students the skills and knowledge for forming and shaping these potentials. Topics include acoustics and the physics of sound (and how a single vibrating string gives rise to music theories around the world), the digitization of sound (and how you can do it yourself with a handful of resistors), sound as art medium and its interpretation and criticism, and the many various tools and techniques for wielding this ephemeral yet eternal wonder.

Part I: Acoustics & Beyond

Chapter 1: Waves

Basic acoustics: Compression/rarefaction, wave simulation, vibration, building a 1-string instrument, harmonics, Acoustic refraction (ice creaks), fun with helium, cymatics, spectrum analysis, Ruben's tubes, whisper corners, Homework: Your first one-string instrument

Chapter 2: Sound & Electricity

Analog & Digital, sampling, quantization, Building your own Digital-to-Analog Converter, How does tape work? (and a garden of tape installations), Using oscilloscopes

Chapter 3: Sound & Electricity Part II: Sound and Music

Transduction, microphones, speakers, a sonic stove, timbre, phasing, Reich's Piano Phase, overtones, harmonics, guest speaker Steven Litt on making noise & homemade sequencers

Field Trip: La Monte Young's *Dream House*

A trip to the influential, avant-garde composer's permanent sound installation, described as "a periodic composite sound waveform environment created from sine wave components generated digitally in real time on a custom-designed Rayna interval synthesizer."

Chapter 4: The Vibrating String: Origins of Music Theory

Intervals & Harmony, the flicker-fusion threshold, Historical tunings, the Pythagorean comma, Just Intonation, Equal temperament, Circle of Fifths, cultural differences in music theories, guest speaker Tristan Perich on microtonality

Project Presentations: Acoustics Experiment

Design a non-digital sound project that explores the concepts of acoustics (waves, reflection, spectra, etc.) in one medium (air, water, fog, jello, ???)

Part II: Practicum

Chapter 5: Obtaining Sound: Micing, Sampling

Microphone theory & techniques, phase cancellation, field recording, sampling, audio file formats & software, history of recording (and the first ever recorded sounds), working with musicians, composition, musical notation

Chapter 6: Making Sound Part I: Analog Synthesis

History, theory and practice of synthesizers; synthesis concepts (timbre, polyphony, types of synthesis, envelopes, modularity) simple DIY analog synth designs, acoustic instrument design, the human vocal tract, tentative guest speaker Lori Napoleon on generating sound from light and building synths

Chapter 7: Making Sound Part II: Digital Synthesis

Software synthesis: PureData, Csound, Supercollider, Overtone, AudioMulch, SPEAR, sequencing, MIDI

Chapter 8: Mixing, Effects & Mastering

Signal chain, signal processing & effects, plugins, mixer designs, levels & compression, psychoacoustics, basics of mastering, Homework: DIY reverb effects

Part III: Sound + Art

Chapter 9: History of Sound Art

Instruments & Installations, Music vs. Art, Visual music, aesthetics of sound, synaesthesia, cymatics, physical manifestations of acoustic phenomena, making the invisible visible, Alvin Lucier, Luigi Russolo, Vito Acconci, Janet Cardiff, tentative guest speaker Margaret Schedel on Sound Art history

Chapter 10: Return of The Vibrating String: Wherefore Music Theory?

art music vs. pop music, institutionality of "classical" music, sampling and reappropriation in musical practice, theories of sound art and music criticism, Pierre Schaeffer & Musique Concrète

Chapter 11: Sound Art Workshop

Workshop for final projects, guest presentation TBD

Final Project Presentations:

What is the psychological and neuroaesthetic role of sound in contemporary art practice? Does sound complement the visual in art, or does the visual complement the sonic—or neither? Where are the boundaries of sound art and experimental music, and does it matter? Design an ambitious sonic artwork that focusses on one class topic and dives deep into its questions, suggests its answers, and radiates waves of beauty.