Analog Heaven

NYU Tandon School of Engineering: Integrated Design & Media

Fall, 2023 – DM-UY 4913 H

Your class meets on:

Tuesdays and Thursdays, 2PM-3:50PM

in

370 Jay Street, Room 308 (classroom) and *2 MetroTech Center, Room 824* (lab)

Your instructors are:

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With some help from the Audio Lab Grad Assistant:

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Introduction

Analog Heaven is an experimental sound class that looks at the history, theory, and techniques behind using electricity to make sound. We will be working with technologies ranging from simple analog circuits to professional-quality synthesizers, as well as digital systems inspired by - or designed in contrast to - these circuits. Along the way we will talk about the ways in which these devices are used to make music across the globe. Students will make a lot of sounds as well as design simple analog circuits, microcontroller interfaces, and work with software such as Max/MSP, as well as doing design research into historical music-making and recording technology. Some experience working with sound and knowledge of digital audio recording and editing is strongly recommended for this course.

Course Objectives

Students in this course will:

- Obtain an overall understanding of analog electric and electronic sound, as well as digital sound as it relates to the former.
- Build simple analog circuits to make and modify electronic sound.
- Listen to electronic music in a cross-cultural, historical context.
- Learn about the history and design of electronic musical instruments, including synthesizers, effects units, and controllers.
- Learn how to work in a hybrid-context audio studio.
- Make sound sketches using the equipment in the audio lab and record them.
- Do an end of year performance / installation using circuits we explore in class.

Prerequisites / Hardware

This class assumes you like sound. That's about it, though having some knowledge of how to work with sound on your computer (e.g. from the IDM Audio Foundation Studio) will help.

For most of the class, we'll be using a combination of the IDM Audio Lab (2 Metrotech Center, Room 824) to work with the synthesizers and other equipment to make sound, and the bench electronics available for IDM student use in 370 Jay Street. You will be using your own laptop for recording, using a combination of free tools.

Some things to download:

Reaper is a free digital audio workstation environment that you can use to record and mix sounds: https://www.reaper.fm/

VCV Rack is a free platform for software emulation of modular synthesizers, which lets you get your feet wet in working with modular synths on your laptop: https://vcvrack.com/

KiCad is a free platform for electronic circuit design that you can use to prototype (and even manufacture) circuit boards: https://www.kicad.org/

There is an extensive studio manual for the IDM Audio Lab here:

https://idmnyu.github.io/audiolab/

Texts / Resources

There is no textbook for this course and we will get you any readings you may need, but one book you may want to check out include:

Handmade Electronic Music: The Art of Hardware Hacking. Nicolas Collins. ISBN: 9780367210106.

Assignments and Grades

For this class, there will be weekly homework, a midterm critique, and a final class performance. The grading breakdown is as follows:

- Everyone needs to show up and participate in class (35%). More than three unexcused absences will lose you a letter grade.
- Everyone needs to complete weekly homeworks - some of these will be to make sound in the audio lab (or at home using things you've already recorded), some will be to work on circuits, some will be presentations based on listening assignments. (30%).
- Everyone needs to complete a midterm critique where they present a sketch of their final design idea (10%).
- Everyone needs to create a final project. This project can be an instrument, controller, or other musical tool that makes analog sound or works with the analog synthesizers in the audio lab. We will integrate all of these devices together into a group performance at the end of the semester. (25%).

Analog Heaven is a 3-credit course at New York University, and students in this course should expect to spend five hours of work per week on coursework (listening to music, studio time, circuit design) outside of class time.

Students With Disabilities

If you are a student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.

Class Schedule

This schedule is subject to change depending on the interests and pace of the class, etc. In addition, a guest speaker or two will come in and talk about their work to the class; which specific class they appear in depends on their scheduling and availability.

Week 1 (9/5, 9/7): Introduction to the class, one another, and the labs. Audio lab training and how mixers and audio interfaces work. Homework: Listen to some music (we will send you a mixtape).

Week 2 (9/12, 9/14): Talk about musical instruments. Crash course in analog circuits. Different types of components. Breadboards, scopes, multimeters, debugging. Homework: Build the kit theremin.

Week 3 (9/19, 9/21): Introduction and history of modular synthesizers. Core design principles of west coast and east coast synthesizers. Using the ARP 2600. Homework: Do a sound recording in the lab.

Week 4 (9/26, 9/28): Analog oscillator design. Soldering. Homework / activity: Build out an astable multivibrator into a cricket: Tune it to do your own thing.

Week 5 (10/3, 10/5): Learning how to learn with the Serge Modular. Make some sounds on the Serge.

Week 6 (10/12): Hook up our crickets to Serge.

Week 7 (10/17, 10/19): Midterm check-in. Talk about rainforests.

Week 8 (10/24, 10/26): Midterm presentations.

Week 9 (10/31, 11/2): All about controllers - ways in which human bodies can interact with circuits.

Week 10 (11/7, 11/9): Prototyping circuits with controls - knobs, toggles, switches, anc capacitive touch.

Week 11 (11/14, 11/16): Composing with electronics. Dani Dobkin and Ben Carey (guests).

Week 12 (11/21): Processing sounds - filters and distortions.

Week 13 (11/28, 11/30): Processing sounds - modulations and delays.

Week 14 (12/5, 12/7): Performing with electronic musical instruments.

Week 15 (12/12, 12/14): Final Project rehearsals and debugging.

Final show sometime 12/18, 19, or 20 in the Garage.

Field trips TBD: Chico Macmurtrie's Robotic Church; Columbia CMC.

Enjoy the class!