

Online Algorithmic Music

Course Syllabus: MAAD 22506 - Autumn 2023

where	when	prof	email	TA
JCL 134	Weds 4:30pm	Nick Briz	nbriz@uchicago.edu	netnet

In this course, students will learn how to use JavaScript and web-based technologies to create algorithmic musical compositions and experimental web-based instruments. Through the use of the WebAudio API and JavaScript libraries like tone.js, students will learn how to programmatically generate and manipulate sound, creating interactive and generative audio works that can be shared online. Along the way, the class will also survey works by artists working in this field and will feature a visiting artist who will walk students through their own practice. Themes of generative art, randomness and chance, originality and machine creativity, and the cultural implications of influential musical algorithms will also be explored. This class is an intermediate level programming course. A beginner to intermediate level understanding of core programming concepts (ideally in JavaScript) is required. While a background in music can certainly be beneficial, it is not required for success in this course.

Schedule

Week 1 (09.26.2023): *Introduction to Algorithmic Music*

- Overview of the course and syllabus
- Introduction to basic music theory
- Introduction to the Web Audio API

Week 2 (10.03.2023): *Introduction to Tone.js & Rythm*

- Introduction to the Tone.js Music Library
- Introduction audio sources/instruments, notes and ADSR
- Workshop: creating loops with the Transport Object

Week 3 (10.10.2023): *Interactive Sounds*

- Workshop: web based theramin
- Survey of interfaces/controllers/events
- *maybe* also the Tensorflow.js AI Library

Week 4 (10.17.2023): *OPEN STUDIO DAY*

- open studio time to work on projects

Week 5 (10.24.2023): *Generative Music Techniques*

- Introduction to basic music theory
- Workshop: Melody Generator and Arpeggiators

Week 6 (10.31.2023): *Sampling and Transcoding*

- Introduction to sound/music sampling
- Workshop: Audio Buffers, sampling audio and other file types

Week 7 (11.07.2023): *Visiting Artist*

- *To Be Determined*

Week 8 (11.14.2023): *OPEN STUDIO DAY*

- open studio time to work on projects

Week 9 (11.21.2023): *Sound Processing*

- Introduction to sound processing
- Survey of effects and analysis algorithms

Week X (11.28.2023): *OPEN STUDIO DAY*

- open studio time to work on projects

assignments

Each assignment should be submitted as a URL on the class canvas (either a netnet.studio project url or a GitHub URL to a repo with an index.html page at the root). All assignments will be produced using JavaScript, the Web Audio API and (optionally) the tone.js library (and/or other audio/musical JavaScript libraries).

Assignment 1: Web-Based Musical Instrument For this assignment, students will design and develop a web-based musical instrument. The instrument should allow users to interact with it and generate sounds in a meaningful way. This should not be a web-based version of an existing instrument (like a guitar or piano) but rather something more experimental which embraces the creative possibilities of the Web. Students should explore different interfaces and consider the use of sensors or controllers to enhance the user experience. The final deliverable will be a functional web-based instrument that can be shared online, along with a brief written reflection on the creative process and technical challenges.

Assignment 2: Algorithmic Composition For this assignment, students will create an algorithmic system that generates musical compositions. This should not be digital/coded version of a pre-existing song or melody and ideally not something that could be easily written as a classical score, rather it should be a composition that leverages the generative potential of the Web. The final deliverable will be a functional algorithm that generates unique and interesting musical compositions, along with a brief written reflection on the creative process and technical challenges.

COMBO: Assignment 1+2: Interactive Composition For students with more ambitious concepts, assignment 1 and 2 can be combined into 1 project. This

can either be a web-based instrument with generative/algorithmic capabilities (like an arpeggiator) or a musical system that is controllable in some way, allowing users to adjust parameters and influence the output of the algorithmic composition. *If you choose this route discuss your concept with me beforehand for approval.* The final deliverable will be a functional web-based interactive algorithmic system that can be shared online, along with a brief written reflection on the creative process and technical challenges.

BONUS: Assignment 3: Sound Processing For this assignment, students will explore the possibilities of sound processing. Students should investigate different techniques, such as filtering, modulation, or granular synthesis, and create a piece of music or interactive system that showcases these techniques. The final deliverable will be either a recorded piece of music that demonstrates the use of sound processing techniques or a web based audio processing tool, along with a brief written reflection on the creative process and technical challenges.

Evaluation:

Assignments are not considered “complete” until I mark them as such on canvas. I will be evaluating assignments based on the criteria below. If/when a student does not satisfy the criteria below I will leave feedback on canvas explaining *why* as well as suggesting for *what* sort of changes you can make to meet the criteria. Assignments are due by the end of the quarter, though it is recommended that students submit assignments as soon as their ready and not wait until the end of the quarter, this way you have sufficient time to address any feedback I leave on canvas.

- Craft (40%): Assignments will be evaluated based on technical proficiency and clarity of code. Students should use appropriate programming concepts, techniques and libraries to create functional and well-designed musical instruments, algorithms and sound processing tools.
- Creativity (40%): Assignments will be evaluated based on originality and creativity of the musical instruments, algorithms and sound processing tools created by the students. Students should leverage the capabilities of JavaScript and web-based technologies to explore new possibilities in music and sound creation rather than simply re-inventing traditional analogue instruments or compositions.
- Presentation (20%): Assignments will be evaluated based on the quality of the final presentation (is it obvious to the user/listener how they are meant to engage with the piece) including the clarity of the written reflection of the musical instrument, algorithm or sound processing tool submitted along with their URL on canvas.

Plagiarism

Plagiarism of concepts, code, compositions, samples and/or other elements is **strongly encouraged**, so long as you leave clear **attribution** within your code via comments. Ensure that anything you copy is in some way **transformed**, either by creating a variation on the copied elements or **combining** those elements with other copied elements. NOTE: transformation/combination (however subtle) is not a substitute for attribution, but rather a requirement for all copied elements.

AI Policy

We're entering a new era of "Machine Learning" or AI. These algorithms are having (and will continue to have) drastic effects on every aspect of our society (including art). Today, artificial neural networks trained on troves of data (which are not always ethically sourced) can make "predictions" and create "hallucinations" (often with clear biases) that would have seemed like impossible sorcery just a few short years ago. In certain high stakes applications this can save lives, but it can also destroy them. In other contexts this biased hallucinatory predictive sorcery can be quite exciting, as is the case with media art. This technology, like many others that came before it (smart phones, the Internet, the computer) will most certainly change everything in our field, exactly how and to what extent is still anyone's guess. In the interest of collectively learning how to leverage its promises and minimize its perils, I encourage anyone interested to experiment with AI (beyond the tools covered in class) so long as you are transparent about what/when/how you use it and are willing to share your process/perspective on it in class.