

Introduction to Computer Music: Visual Programming with Max

- MUCO 592 | Fall 2019 -

Wednesday 2-3:50pm | MUS 319

Instructor:

Dr. Nina C. Young

Office: MUS 309

Office Hours: Wed 1 - 2pm, or by appointment

Email: ninayoun@usc.edu

Pronouns: she/her

Course Description:

This seminar, geared towards composers and musicians as well as students with an interest in programming and some musical background, investigates the computer as a tool for generative music and enables the creation of multimedia interactive performance, composition, and improvisation environments. Students will learn the visual programming environment Max (formerly known as Max/MSP, developed by Cycling '74) supplemented with other computer/electronic music tools to implement creative projects. Basic familiarity with digital audio and DAWs recommended, previous programming experience not required.

This course is divided into four areas:

1. **Building Blocks:** the fundamentals of Max
2. **MIDI:** basics of MIDI protocol, sequencing, algorithms, external controllers
3. **Signal Processing:** digital signal processing, filters, buffers, and real-time treatments
4. **Advanced Applications:** patch architecture, externals, data storage

Weekly programming assignments solidify concepts covered in class, and are geared towards a larger final project.

Course Objectives:

- Learn how to program in Max/MSP to create music, audio, and video applications. Max is a huge and complex program, with hundreds of specialized routines and custom interfaces. In this class we will barely scratch the surface of what can be done with it. At its heart, Max is no different than any other higher-level programming language. Yet it is easy to do basic things, and there are lots of shortcuts and read-to-use examples in the language, help-files, and tutorials to aid in your learning curve. If you really want to master Max, it takes patience, discipline, hard work, and lots of practice - just like learning to play an instrument!
- Use Max/MSP to study audio synthesis and processing algorithms.

- Implement examples of algorithmic and generative composition.
- Write an original piece of interactive computer music (or design a performance environment, or other approved final project) using primarily MaxMSP.
- Become aware of repertoire, including contemporary and historic works of interactive composition and performance.

Materials:

- A licensed copy of Max8 on personal computer. Available at <https://cycling74.com>
 - Start with the 30 day trial
 - After 30 days, purchase an academic license:
 - \$250: Max Academic Permanent License (with \$99 upgrades to future versions) - recommended
 - \$59: Max Academic Annual Subscription
- All other software is optional and should be purchased at the discretion of the student. Note: some of the supplemental tools I will demo in class are only available on Macs. This does not mean that there aren't PC equivalents available.
- Additional readings / listening: available for download or from the library.

Supplemental Materials:

- DAW (Digital Audio Workstation) such as Logic Pro, Cubase, ProTools, Ableton, etc
 - Free: Ardour, Audacity
- Cipriani, Alessandro & Maurizio Giri: *Electronic Music and Sound Design - Theory and Practice with Max 8*
- Manzo, V.J. *Max/MSP/Jitter for Music: A Practical Guide to Developing Interactive Music Systems for Education and More*
- Roads, Curtis: *The Computer Music Tutorial* (Cambridge: MIT Press, 1996)
- Taylor, Gregory: *Step by Step - Adventures in Sequencing with Max/MSP* (Cycling 74, 2018)

Assessment Measures:

Programming and HW Assignments (assigned weekly)	50%
Midterm Exam / Project	10%
Curated Listening List Project	10%
Final Composition Project	25%
Class Participation	05%

Blackboard will be used to communicate all course information including calendar updates, lecture notes, example patches, listenings, readings, and assignment prompts. All assignments must be submitted on Blackboard unless

otherwise noted. Students must come to class with assignments on their computers and be prepared to present them in class.

Programming and HW Assignments will be posted at the end of every week. Students are responsible for checking Blackboard for updates, prompts, and deadlines.

The Midterm Exam is a guided programming project due at the beginning of class on October 16th.

For the *Curated Listening List Project* you will create a listening guide of 7-12 pieces, performances, installations, etc. that use MaxMSP or live/interactive electronics that are of interest (to you). This project will contain A/V files (links to streaming services, legal downloads, or a zipfolder) and an accompanying text that guides the listening experience (think blog post, pitch fork review, etc.). You may format this as a shareable text document, PDF, google doc, website, etc. The text should comment on historical information, personal opinions about the music, and comments about its composition and production techniques. (Minimum of 1 paragraph per piece). All pieces must be listed with bibliographic information (composer, performers, title, date, label - if applicable, etc.).

Final Projects are to be presented during the last week of class. You will be assigned a time. A folder with all final project files and an instructional document must be uploaded to Blackboard by December 11, 11:59pm.

Course Calendar

All instructions, assignments, readings, and essential information will be on the Blackboard website. Check this site regularly to stay updated on the course schedule.

Class Schedule and Topics:

Class 01: 08.28.2019: Intro to class. What is 'interactive electronics'? What is Max? Installing and navigating Max. Help files, resources, tutorials.

Class 02: 09.04.2019: Max data types. Printing. Numbers and and Max.

Class 03: 09.11.2019: More arithmetic. Logic Functions. Gates and Switches.

Class 04: 09.18.2019: First look at generative music. Random generators. What is MIDI? Controllers. Data storage, messages, table, coll.

Class 05: 09.25.2019: More MIDI. Timing (metro, tempo, transport). Midi sequencing (seq). Multislider. MC objects.

Class 06: 10.02.2019: List Processing - Sorting lists (zl). Probability (prob, histo, anal, mean).

Class 07: 10.09.2019: Routing and Data Storage.

Class 08: 10.16.2019: ***Midterm Projects Due***. Intro to MSP - Digital Audio and Signal Processing. Simple oscillators and waveforms, sound file playback.

Class 09: 10.23.2019: Buffers and samplers.

Class 10: 10.30.2019: Intro to Synthesis Techniques (additive, subtractive, AM, FM)

Class 11: 11.06.2019: All things Delay. Filters and EQ.

Class 12: 11.13.2019: Creating external processing modules using other 3rd party externals and Max for Live Objects (AMXD~), with messages, pattr storage, #1, #0, etc.. More advanced routing and data storage. Package Manager. Filepath systems and organizing your patches.

Class 13: 11.20.2019: Performance Patch Architecture and Organization. Inputs, Outputs, Routing, Cueing, and Events.

Class 14: 12.04.2019: Final Project Presentations.

Assignments:

HW 01: Preliminary Questionnaire. Installing Max, Sound Synthesis Refresher, Basic Tutorials, 2 Simple Programming Assignments. Due 09/04, 12pm.

HW 02: Tutorials. Calculators and Dice Games. Due 09/11, 12pm.

HW 03: Tutorials. Calculators. Due 09/18, 12pm.

HW 04: Fun with MIDI! Due 09/25, 12pm.

HW 05: MIDI Sequencing and Timing. Due 10/02, 12pm.

HW 06: MIDI Sequencing and Timing, with Probability. Due 10/09, 11:59pm.

MIDTERM PROJECT: Duet for one pianist. Due 10/16 2pm (with in-class performance).

HW 07: Simple DJ Player with MSP. Due 10/23, 12pm.

HW 08: Looping in Max with Buffers. Due 10/30, 12pm.

HW 09: Synthesis Soundbank. MSP tutorials, Due 11/06, 12pm.

HW 10: Delay and looping environment. Final Project Proposals. Due 11/13, 12pm.

HW 10: Several external modules for your final project. Due 11/20, 12pm.

Curated Listening List Project. Due 12/02, 11:59pm.

Final Project Presentation. Due 12/04, 2pm (with in-class performance).

Final Project Materials and Documentation. Due 12/11, 11:59pm.

Course Policies:

Classroom expectations:

All students are expected to participate in class discussion, and are expected to respect the opinions and statements of their classmates during discussion and classroom activities.

Attendance:

Since I do not rely on a single textbook, but instead draw from various sources, some of which are unpublished, it is essential that you attend class regularly. Excessive absences will be noted and will affect your final grade, both directly (class participation grade) and indirectly (you won't know what you're doing in the assignments, quizzes, midterm exam, and/or the final exam/project). This is a fun class, show up, learn stuff, and you'll do just fine!

Assignments:

All assignments must be submitted via Blackboard by the due date and time specified. Any sounds, abstractions, plugins, or other external files must be included in your submission. If something is missing, you will be notified and given the opportunity to resubmit, but with a late penalty. All grades are considered final and non-negotiable.

Late Assignments:

This is a graduate seminar. Treat the class with respect and do your work. Late assignment submission will be reflected in your grade. Just do the work, even if it isn't perfect - you will learn something! Yay!

Final Projects and Midterms deadlines are non-negotiable.

Student Rights and Responsibilities:

- You have a right to a learning environment that supports mental and physical wellness. You have a right to respect.
- You have a right to be assessed and graded fairly.
- You have a right to freedom of opinion and expression.

- You have a right to privacy and confidentiality.
- You have a right to meaningful and equal participation, to self-organize groups to improve your learning environment.
- You have a right to learn in an environment that is welcoming to all people. No student shall be isolated, excluded or diminished in any way.

With these rights come responsibilities:

- You are responsible for taking care of yourself, managing your time, and communicating with the teaching team and with others if things start to feel out of control or overwhelming.
- You are responsible for acting in a way that is worthy of respect and always respectful of others.
- Your experience with this course is directly related to the quality of the energy that you bring to it, and your energy shapes the quality of your peers' experiences.
- You are responsible for creating an inclusive environment and for speaking up when someone is excluded.
- You are responsible for holding yourself accountable to these standards, holding each other to these standards, and holding the teaching team accountable as well.

Personal Pronoun Preference and Names:

Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by a name different than what appears on the roster, and by the gender pronouns you use. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards

<https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>.

Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity <http://equity.usc.edu> or to the Department of Public Safety <http://adminopsnet.usc.edu/department/department-public-safety>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for

Women and Men <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students.

The Office of Disability Services and Programs

http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html

provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology .