Music 220a: *Fundamentals of Computer-Generated Sound*
Spring Quarter 2021 | Stanford University *(Syllabus v1.1)*

Instructors
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Time and location
Class meetings: MW 4:00-5:20pm [Monday (3/29) until Wednesday (6/2)]
Location: (online via Zoom)

Course Summary
This is an introductory course to computer music, covering a variety of topics including computer-based sound generation, programming tools for music creation, digital synthesis techniques, as well as technological, aesthetic, and social issues in computer music. The course uses the [ChucK programming language](#) for assignments. The format consists of lectures, discussions, code-based creative projects, studio-style critiques, and a final project. Programming experience is recommended but not required; all are welcome.

Course Learning Goals
Through active engagement and completion of course activities, you will be able to:
1) Understand computer music as a discipline, encompassing digital audio basics, activities in the domain of computer music, and basic tools for working with computer audio
2) Generate sound with software programming
3) Craft musical statements using various computer-mediated techniques
4) Recognize and frame aesthetic and social questions in computer music
5) Adapt the course to your personal experiences, interests, and circumstances

Course Topics
***What** is computer music?*
- What is a digital sample?
- What is digital audio?
- What are some common tools people use to work with digital audio?
- Basics of time domain, frequency domain, and time-frequency domain for audio. (forming an intuition for "reading" these and "knowing what they sound like")
- A brief survey of some active areas in the domain of computer music?

***How** to make computer music? Bread and butter programming elements:*
- What is a unit generator?
- How to work with control rate vs. audio rate (block-based processing vs. single-sample processing)
- Techniques for structuring musical events occurring over time
- Interactivity (responding to QWERTY, mouse, MIDI, OSC)

How to make computer music (part 2)? Basic techniques for sound synthesis
- Generators: oscillators, noise, sample playback
- Envelopes and Filters
- Processing: echo, reverb, other effects
- Basic synthesis techniques: additive, subtractive, physical modeling, frequency modulation, and more
- Paying attention to psychoacoustics in sound synthesis (auditory streaming, masking, critical bands, loudness curves, knowing how to use the whole frequency spectrum)

How to make computer music (part 3)? Computer music system thinking
- Interconnectivity (getting your software to work with other software)
- Breaking larger software into smaller chunks (procedures, subpatches, modules…)
- Designing for the total experience (audio, musical, performative, visual, etc.)

Why make computer music? Some aesthetic questions
- Why, indeed, make computer music?
- What makes for "good" computer music?
- What are the unique affordances of the computer for music making?

Who makes computer music, where and when? Some social questions
- Historically, who makes computer music?
- Combating the problem of under-representation in computer music.
- Technology and the "democratization" of music production

Readings
Will be freely-available online and distributed via Canvas.

Technology
You will need to have access to a computer that connects to the Internet so that you can access email, Canvas, Zoom, and the software tools in this course (including ChucK and Audacity). For class meetings, we strongly recommend that you participate on a computer or laptop as we will be sharing our screens and making use of various features of Zoom that are best accessed on larger devices rather than mobile ones. All course details and materials will be posted on our Canvas course site and all class meetings will occur in Zoom. Please download Zoom and follow these instructions to help you get set up. It is important that you do not share our course Zoom links or meeting passwords with anyone outside of our course to protect the privacy of everyone in attendance. Students on campus can borrow equipment from the Lathrop Learning Hub.

Academic Accommodations

Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for instructors dated in the current quarter in which the request is being made. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: http://oae.stanford.edu).

Even if you do not have a documented disability, variability in how people learn is a documented phenomenon. Staff at the Schwab Learning Center can meet with you individually and help you identify your learning strengths, as well as areas for growth, and connect you to available support.

Student athletes who anticipate challenges in being able to attend synchronous class meetings or submit assignments on time should speak to a course or section instructor as soon as possible about available accommodations.

Learning Resources

Have you ever noticed that elite performers across different fields - from athletes to musicians to leaders - work regularly with coaches? No matter what the domain and where you are starting from, consistent practice and guidance from others can help you improve your skills. In the academic context, this includes specific skills, such as essay-writing or quantitative problem-solving, as well as the more general skills of learning (anything) effectively and maintaining your well-being. Stanford has a wide range of tutors and coaches to help you up your game. Which will you take advantage of?

For this course, we especially recommend:
● Academic skills coaches from the Center for Teaching and Learning, to help you manage your time and work effectively during online and remote learning
● Virtual study halls, organized by the Center for Teaching and Learning, to work and learn in quiet, virtual companionship with other students
● CCRMA also has a virtual study hall: https://ccrma.stanford.edu/studyhall/

Other campus resources include:
● Remote Learning Strategies, from the Center for Teaching and Learning
● Well-Being services, including well-being coaches, Vaden Health Center
● Tutoring for Learning Differences, Schwab Learning Center
● Tutoring for Student Athletes, AARC

For more information on Music 220a, please visit:
https://ccrma.stanford.edu/courses/220a-spring-2021/