Electronic Synthesizer Techniques, MTEC 474b
Course Syllabus Spring 2021

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Course Goals

It is the goal of this course that each student—upon successful completion—gains a theoretical and practical understanding of intermediate electronic synthesizer and sampling techniques. These will include a working knowledge of electronic synthesizers, effect processors and the components of the synthesis process. To reach this goal, each student must successfully accomplish the objectives described below.

Course Objectives

- Using contemporary production techniques, demonstrate proficiency of fundamental concepts in sound theory by applying them to practical real-world examples
- Create original presets, patches and recorded audio sound-sets using electronic synthesis including: subtractive, additive, physical modeling, frequency modulation, sample-based, wavetable and granular
- Synthesize, process and catalog sounds for personal music libraries
- Describe, explain, and demonstrate the process of making musical sounds with electronic synthesizers and various additional tools and technology
- Create and produce musical compositions and arrangements with synthesized and processed sounds

Requirements, Exams and Grading Information

Student assessment in MTEC 474b will consist of exercises, mid-term, final project and a final exam. Unless otherwise noted, all exercises are due one week from the date assigned.

All assignments are to be turned in to the class DropBox, accessed through Blackboard, and must carefully follow file naming conventions, file management and format guidelines.

The final project will consist of a musical sound design sequence, 3 to 4 minutes in length. Students will document their workflow and explain it in a, no longer than 7 minute, screen capture. In addition, students will submit a cataloged library of patches, device presets and impulses responses designed for their composition. Further instructions will be available at a later date.

Required Class Texts

Andrea Pejrolo and Scott B. Metcalfe. Creating Sounds from Scratch: A Practical Guide to Music Synthesis for Producers and Composers (1st Edition) (2017)

Dennis DeSantis, et al. *Live Reference Manual (Version 10)*

Apple Inc. Logic Pro X Instruments Reference Guide

Shepard, Brian. Refining Sound (2013). (Recommended)

Required Software

APPLE LOGIC PRO X (10.5)
Apple Pro Apps for Education: $199
Includes Logic, Final Cut Pro, Compressor, Main Stage and more
Web link: Apple EDU Store

ABLETON LIVE SUITE
Ableton will offer complimentary full functioning free demos for the duration of the semester to students in classes where Live Suite is the primary DAW - TBA
Ableton Live Suite Edu purchase price: $449 ($74.83 for 6-months)
Web link: Ableton EDU Shop

Screen Capture software (QuickTime Player, Screen Flow or equivalent)
Syntorial https://www.syntorial.com/ (Recommended)

Required Hardware

Reference headphones (Sony, MD 7506 or the equivalent required)

Apple computer capable of running Ableton Live 10 and Logic Pro X

Communication

Please make it a daily habit to use/check your USC E-mail account. Any E-mails I send to the class will use that account. *****Please add "MTEC 474b" in the subject header of all emails***** This will help me to organize all the emails that I receive and respond to you more quickly. Additionally, all course materials and class grades will be posted on BlackBoard.

Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.-5:00 p.m. Monday through Friday. The phone number for DSP is 213/740-0776.

Grading Summary

1.	Participation	10%
2.	Exercises	35%
3.	Mid-term Project	10%
4.	Final Exam	15%
5.	Final Project	30%

Grading Scale:

92 – 100 = A	90 – <92 = A-	88 – <90 = B+
82 – <88 = B	80 – <82 = B-	78 – <80 = C+
72 – <78 = C	70 – <72 = C-	68 – <70 = D+
62 – <68 = D	60 – <62 = D-	<60 = F

Assignments are due by the beginning of the class period indicated in the course outline below. Assignments turned in after the deadline will be marked late and penalized 10% for that day as well as 10% for each additional day or portion of a day that they are late. Allow for slow Internet connections and server upload time so that your files are completely uploaded before the deadline. The Final Project may not be submitted late. Final projects not turned in by the deadline will receive a grade of zero.

Throughout the semester, questions about your grades should be addressed immediately. Do not wait until the semester has ended to resolve a grading issue.

Notes

Each class will contain both theoretical and practical experiences. Should the needs of the class so dictate, I reserve the right to change the course outline. You will be notified of any substantive schedule changes.

Schedule

Week 1 **University Holiday, Martin Luther King Jr.**

Week 2 **Workflow Strategies, Course Outline, Expectations**
Introduction
Policy and procedures
Preferences, settings and standards
Overview - software synths
Reading: *Creating Sounds from Scratch* chapter 1
Audio/Video Examples: *Creating Sounds from Scratch* chapter 1
Exercise 1: Subtractive presents, Submit a music example

Week 3 **Tools, Texture, Timbre, Tonality**

Tools for the task: Considerations, Categories, Characteristics
Recognition - Ear training (simple and complex waveforms)
Experimenting with harmonics, partials and overtones
Critical listening and ear training
Production techniques:
- Strategies for recreating sounds
- Backwards engineering patches and presets

Audio/Video Examples: *Creating Sounds from Scratch* chapter 2 and 3
Reading: *Creating Sounds from Scratch* chapter 2 and 3
Exercise 2: Reconstructing sounds from audio examples

Week 4 **Additive Design - Sine Waves, Fundamentals and Overtones**

Characteristics of Additive Synthesis
Resynthesis, Cross Synthesis and Spectral synthesis
Production techniques: Alchemy
- Controlling harmonics: envelope, pitch, pan
- Layering sources for evolving pads and sound effects
- Combining additive and spectral synthesis

Reading: *Creating Sounds from Scratch* chapter 6 (pp. 175-192)
Logic Pro X Instruments Reference Guide (Chapter: Alchemy)
Audio Examples: *Creating Sounds from Scratch* chapter 6
Exercise 3: Sound design: Resynthesis, Spectral, Resynthesis + Spectral

Week 5 **University Holiday, Presidents Day**

Week 6 **Advanced Modulation Techniques and Effects Manipulation**

Filters and routing
Modulators - Alchemy
- LFO, AHDSR, MSEG, ModMap, Sequencer

Auxiliary and master effects
Production techniques: Alchemy
- Sound sculpting (Ethereal to Aggressive)
- Looped and tempo synced sources

Reading: *Creating Sounds from Scratch* chapter 6 (pp. 192-202)
- *Logic Pro X Instruments Reference Guide* (Chapter: Alchemy)

Audio Examples: *Creating Sounds from Scratch* chapter 6
Exercise 4: *Creating Sounds from Scratch* chapter 6
Assignment: Mid-Term Project - Original Sequence (Due Week 9)

Week 6 **Percussive Plucks and Resonating Arpeggiation**
Characteristics of Physical Modeling
Components: Resonator, Generator, Damper
Production techniques: Collision
Percussive plucks for rhythms and melodies
Arpeggiated sequences and syncopated ostinato phrases
Reading: *Creating Sounds from Scratch* chapter 8
Audio/Video Examples: *Creating Sounds from Scratch* chapter 8
Exercise 5: *Creating Sounds from Scratch* chapter 8

Week 7 **Bass and Drums with Physical Modeling and Modal Synthesis**
Production techniques: Sculpture
Building an electric bass
Synthesizing drums and percussion
Reading: *Logic Pro X Instruments Reference Guide* (Chapter: Sculpture)

Week 8 **Evolving Pads and Experimental Ambience**
Characteristics of WaveTable synthesis
WT position, intensity
Vector Synthesis
Lookup Table
Modulating/Automating Lookup Tables
Creating WaveTables for Alchemy
Production techniques: WaveTable
Evolving pads and leads
Experimental effects and ambience
Reading: *Creating Sounds from Scratch* chapter 9 (pp. 291-314)
Audio/Video Examples: *Creating Sounds from Scratch* chapter 9
Exercise 7: *Creating Sounds from Scratch* chapter 9 (ex. 9.1, 9.2)

Week 9 **In class student presentations and feedback mid-term projects**
Assignment: Final Project - Due Week 13

Week 10 **Audio Manipulation Techniques - Granular Synthesis**
Granular software synthesizers overview
Grain splitting
Separating pitch and time
Creative warping for sound design
Production techniques -
Max for Live: Granulator II - Turning inharmonic sounds harmonic
Alchemy - Granular preset creation

Reading: *Creating Sounds from Scratch* chapter 9 (pp. 315-324)
Audio/Video Examples: *Creating Sounds from Scratch* chapter 9
Exercise 8: *Creating Sounds from Scratch* chapter 9 (ex. 9.3, 9.4)

Week 11 **Creative Convolving**
Capturing impulse responses
Convolving hardware and software
Production techniques: Texturizing through convolution
Amalgamating impulse responses
Advanced modulation techniques
Reading: TBA
Exercise 10: Capture impulse responses and modify for personal sound libraries

Week 12 **Guest Lecture TBA**

Week 13 **Final Project In Class Presentations and Feedback**

Week 14 **Take-home Final Exam due**
(See BlackBoard - Assignments for due dates)

Synchronous Session Recording Notice

As required by USC, the synchronous sessions for this course will be recorded and provided to all students asynchronously. This policy does not apply to individual lessons.

Sharing of course materials outside of the learning environment

USC has a policy that prohibits sharing of any synchronous and asynchronous course content outside of the learning environment. Please do not share or otherwise distribute class materials, music scores or recordings produced by me or any students in the conduct of this course without expressed permission.

SCampus Section 11.12(B)

Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (SeeSection C.1 Class Notes Policy).

Zoom etiquette

I expect you to demonstrate your presence and participation in class by your being on camera in all Zoom sessions. If you will be unable to keep your camera on during the synchronous Zoom session, please contact me prior to the class session to discuss.

USC technology rental program

We realize that attending classes online and completing coursework remotely requires access to technology that not all students possess. If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university's equipment rental program or other assistance. To apply, please submit an application on the Student Basic Needs portal.

USC Technology Support Links

Zoom information for students

Blackboard help for students

Software available to USC Campus

Statement on Academic Conduct and Support Systems

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://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us . This is important for the safety 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 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.