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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 11 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

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 | 20% |
| 2. Exercises | 30% |
| 3. Mid-term Project | 15% |
| 4. Final Exam | 15% |
| 5. Final Project | 20% |

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 **Workflow Strategies, Course Outline, Expectations**

Introduction

Policy and procedures

Preferences, settings and standards

Overview - software synths

Reading: *Creating Sounds from Scratch* chapter 1

Exercise 1: Subtractive presents, Submit a music example

Week 2 **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
Reading: *Creating Sounds from Scratch* chapter 2 and 3
Exercise 2: Reconstructing sounds from audio examples

Week 3 Labor Day Holiday

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

Week 7 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

Exercise 5: *Creating Sounds from Scratch* chapter 8

Week 8 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 9 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)

Exercise 7: *Creating Sounds from Scratch* chapter 9 (ex. 9.1, 9.2)

Week 10 In class student presentations and feedback mid-term projects

Assignment: Final Project - Due Week 13

Week 11 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)

Exercise 8: *Creating Sounds from Scratch* chapter 9 (ex. 9.3, 9.4)

Week 12 Creative Convolution

Capturing impulse responses

Convolution hardware and software

Production techniques: Texturizing through convolution

Amalgamating impulse responses
Advanced modulation techniques
Exercise 10: Capture impulse responses and modify for personal sound libraries

Week 12 **Guest Lecture TBA**

Week 13 **TBA**

Week 14 **Final Project In Class Presentations and Feedback**

Week 15 **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. (See Section 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

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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.