MAT 200B
Music and Technology

Fall 2014, Tuesday-Thursday 3-5 PM
Studio Xenakis, Room 2215, Music Building
Professor Curtis Roads, Elings Hall 2203
University of California, Santa Barbara
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Teaching assistant: Mr. Aaron Demby Jones, aaron.demby.jones@gmail.com

Week 1  Orientation; Historical overview of electronic music
2 Oct
Introductions and orientation
The legend of electronic music I
Assignment
Read "The great opening up of music to all sounds," pages 21-62 of Electric Sound by Joel Chadabe.
Read "Evaluating audio projects"
Quiz 1 next Thursday on the Chadabe text
Final project assignment
Choose one of three options: PAPER, STUDIO PROJECT, or PROGRAMMING/MAKING, and realize a final project in consultation with the instructor. All projects are presented in class. Here are some possible projects.
1. PAPER
   Present an historical or technical paper. An historical paper might focus on, for example, a pioneer of electronic music, such as Clara Rockmore, Theremin, Xenakis, Hiller, Stockhausen, Varèse, Bebe Barron, etc. A technical paper should focus on a topic related to digital audio or music, such as audio analysis, digital sound formats, Internet audio, digital rights management, musical feature extraction, high-resolution audio, etc. (10-20 double-spaced pages typical)
2. STUDIO PROJECT USING MULTIRACK RECORDING, EDITING, MIXING
   The studio project could be original music or a soundtrack for a video project, an audio documentary, audio play, sound art, environmental, or ambient piece
3. PROGRAMMING/MAKING PROJECT
   Develop software and or hardware related to digital audio and music using Matlab, SuperCollider, Csound, C++, Java, Max/MSP, Python, etc.
Bring a 1-page project proposal to discuss with the instructor by Week 5
The final project is due the last day of class. There is no separate "final exam" time.

Week 2  Audio science: The nature of sound
7 Oct
The legend of electronic music II
Listening:
- The historical CD of digital sound synthesis (Wergo)
- Sage of the Philips Pavilion
Viewing: Poème électronique by Edgard Varèse
9 Oct
Quiz 1 on Chadabe historical reading; discussion of Chadabe text.
Lecture: The nature of sound
Assignment
Read (PDF) handout: "The nature of sound" by Curtis Roads
- Listening: Excerpts of POINT LINE CLOUD (2005) by Curtis Roads (Sculptor, Half-life 1, Pictor alpha)

Week 3  Audio engineering: digital audio fundamentals
14 Oct
Lecture: Basics of digital audio, quantization and sampling rates.
Listening
Bernard Parmegiani: De Natura Sonorum (1975)
The electronic music of Luciano Berio

Assignment
There is also a copy in Studio 2215.

Read handout: pages 52-55 on digital audio formats from Introduction to Computer Music by N. Collins

Read handout: “Audio compression” Wikipedia

Quiz 3 on digital audio Wednesday Week 4.

16 Oct
Quiz 2 on the nature of sound
Lecture 1: The world of modular synthesis
Listening: Modular synthesis music
Electronic music of Morton Subotnick: Silver Apples of the Moon, Touch Sidewinder DVD (Visual Music)
Music by Richard Devine

Lecture 2 at 4:15 Michael Hetrick presents the new modular world

Week 4 Audio engineering: microphones and synthesis techniques

21 Oct
Q3 on digital audio concepts
Lecture 1: Microphone and stereo microphone techniques

Assignment
Read handouts: “Microphones” by S. Alten and “Coincident stereo microphone techniques” by R. Streicher
Quiz 4 on microphones next week

Viewing
Film excerpts: Theremin, an Electronic Odyssey, part 1

CREATE LECTURE: INSTRUMENTAL LAPTOP BY NEIL ROLNICK. 21 October at 5 PM Music 2215.

23 Oct
PROF. ROADS AWAY
Viewing
Film excerpts: Theremin, an Electronic Odyssey, part 2

Week 5 Audio engineering: techniques of digital sound synthesis

28 Oct
Quiz 4 on microphones
**Bring your final project proposals. Discussion of final project proposals
Lecture 1: Taxonomy of sound synthesis techniques I
Listening: Taxonomy of synthesis sound examples

Assignment
Read handout: Chapter 5 of Introduction to Computer Music by N. Collins
Quiz 5 next week
Class discussion
Listening
Ilhan Mimaroglu: Six preludes for magnetic tape (1967)
Viewing
Fellini Satyricon, featuring Ilhan Mimaroglu’s electronic music

30 Oct
Lecture: Sound synthesis techniques II, focus on graphical synthesis
Play Percy Grainger CD
Demonstration of MetaSynth
Listening: Music of Ligeti
Gyorgy Ligeti, Artikulation (1958), with projection of graphic score
Viewing: excerpts from 2001: A Space Odyssey with music by Ligeti

Week 6 Audio engineering: signal processing techniques; sound in space

4 Nov ELECTION DAY: VOTE
Quiz 5 on sound synthesis techniques based on Collins reading
Lecture: Taxonomy of audio signal processing techniques, demonstration in audio editors
Listening: Spatial audio
Virtual sound demo on headphones; dummy head recording

Assignments
Read handout “Sound in space: an overview” by Curtis Roads.
Quiz 6 next week.
Bring an example of (1) good recording technique, (2) bad recording technique
Be prepared to defend your selection. Due next Tuesday.

6 Nov
Lecture: Sound in space
**Altiverb convolution reverberation movie (www.audioease.com)**
Lecture: Taxonomy of audio signal processing techniques II, demonstration in Peak
Viewing: Visual music
  Pioneer of Visual Music: Norman McLaren
  Roads/O'Reilly: Fluxon DVD

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**Week 7  Generative strategies**

11 Nov
Quiz 6 on spatialization
Presentation of recordings selected by students; class discussion
Listening
  Music of Luc Ferrari

13 Nov
Lecture: Generative strategies
Listening
  Generative music examples

CREATE LECTURE: ACOUSTICS AS A COMPOSITIONAL PARAMETER BY RAGNAR GRIPPE. 5:30 PM Music 2215.

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**Week 8  The art of mixing**

18 Nov
Discussion of progress on final projects
Lecture: The art of mixing and mastering
Viewing and Listening
  The music of Oskar Sala and his Mixtur-Trautonium
  The Birds by Alfred Hitchcock, soundtrack by Oskar Sala
Assignment
  Read Chapter 9, "Sound mixing and monitoring" in The Computer Music Tutorial
  Quiz 7 next week

19 Nov SPECIAL EVENT: CREATE CONCERT. Lotte Lehmann Concert Hall. 7:30 PM. Works by David Rosenboom, Curtis Roads, Jeremy Haladyna, and The CREATE Ensemble

20 Nov
Lecture: Decyphering Stockhausen’s Kontakte (1960)
Viewing
  Film excerpt: Stockhausen “Four criteria of electronic music”

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**Week 9  Microsound**

25 Nov
Quiz 7 on mixing and monitoring
Lecture: Introduction to microsound: synthesis and transformation
  Play examples from the book and from dictionary-based pursuit examples
Lecture: Business aspects of music: producing, book and recording contracts

27 Nov THANKSGIVING HOLIDAY

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**Week 10  MIDI and OSC**

2 Dec
Introduction to controllers, MIDI, and OSC. Guest lecture by Matt Wright.

4 Dec
To be determined.

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**Week 11**

8-12 Dec  Dead week; no class; prepare for final presentations

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**Week 12  Final projects**

16 Dec
Summary of the course and discussion
Final examination. Presentation of final projects

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