MAT 200B: Music and Technology

Fall 2015, Tuesday 12-2PM, Thursday 4-6 PM

Studio Xenakis, Room 2215, Music Building
Instructor: David Gordon

Email: dgordon412@gmail.com

Textbook: *The Computer Music Tutorial* (1996) by Curtis Roads, The MIT Press

Grading:

Attendance: 10%
Quiz scores: 25%
Final Project Proposal: 15%
Final Project: 50%

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 MULTITRACK 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, Processing, 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 1 Orientation

Sept 24: Introductions and orientation

> **Assignment: Read "The origins of electronic music," by Andrew Hugill by Oct. 1**
> **Quiz 1 next Thursday on the Hugill text**

Week 2 The Nature of Sound

Sept 29: Early Electronic Music
Listening: Varese, Cage, Ussachevsky
The Saga of the Philips Pavilion
Viewing: Poème électronique by Edgard Varèse

Oct 1: The Nature of Sound
Quiz 1 on Hugill historical reading; discussion of Hugill text.
Lecture: The nature of sound

Assignment: Read (PDF) handout: "The nature of sound" by Curtis Roads by Oct. 8
Quiz 2 next Thurs. on Roads handout
Listening: Excerpts of *POINT LINE CLOUD* (2005) by Curtis Roads

Week 3 Digital Audio Fundamentals

Oct 6: Lecture: Basics of digital audio, quantization and sampling rates.
Listening Bernard Parmegiani: *De Natura Sonorum* (1975)
The electronic music of Luciano Berio

Assignment: Read Chapter 1 "Digital Audio Concepts" in *The Computer Music Tutorial* by Oct. 15
Quiz 3 next week on digital audio concepts

Oct 8: Quiz 2 on the nature of sound based on Roads handout
Lecture: 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

Week 4 Microphones and Synthesis Techniques

Oct 13: Lecture: Microphone and stereo microphone techniques
Assignment: Read handout: "Microphones" by S. Alten by Oct. 22
Quiz 4 next week on Alten handout
Viewing film excerpts: Theremin, an Electronic Odyssey

Oct 15: Quiz 3 on digital audio concepts
Lecture: The Vocoder, Speech synthesis
Listening: Clarence Barlow, *Im Januar am Nil, Orchideae Ordinariae*

Week 5 Techniques of Digital Sound Synthesis

Oct 20: ***Bring your final project proposals.*** Discuss proposals in class.
Assignment: Read handout: Chapter 5 of *Introduction to Computer Music* by N. Collins by Oct. 29
Quiz 5 next week on Collins handout
Lecture: Taxonomy of sound synthesis techniques
Listening: Sound synthesis examples, Ilhan Mimaroglu: *Six preludes for magnetic tape* (1967)
Viewing: Fellini *Satyricon,* featuring Ilhan Mimaroglu's electronic music

Oct 22: Quiz 4 on microphones based on Alten reading
Lecture: Sound synthesis techniques II, focus on graphical synthesis
Demonstration of MetaSynth
Listening: Gyorgy Ligeti, Artikulation (1958), with projection of graphic score, Atmospheres (1961), Volumina (1961)
Viewing: Early experimentation with sound ornaments: Variphone, Oskar Fischinger, ANS Synthesizer, Norman MacLaren, John Whitney

Week 6 Signal Processing Techniques

Oct 27: Lecture: Audio signal processing techniques
Demonstration in audio editors
Listening: Spatial audio

Oct 29: Quiz 5 on sound synthesis techniques based on Collins reading
Lecture: Audio signal processing techniques II, reverb and convolution
Demonstration in audio editors
Viewing: Pioneer of Visual Music: John Whitney Roads/O'Reilly: Fluxon DVD

Week 7 Algorithmic Music

Nov 3: Lecture: Algorithmic music I
Listening: Hiller, Xenakis, Cope

Nov 5: Lecture: Algorithmic music II, sonification, evolutionary music

Week 8 Graphic Notation / Spatial Sound

Nov 10: Lecture: Graphic notation, history of notation,
Listening: Daphne Oram, Norman MacLaren

Nov 12: Lecture: Spatial sound, diffusion, refraction, binaural cues, HRTFs
Demo of spatial sound techniques

Week 9 Microsound

Nov 17: Lecture: Microsound: Synthesis and transformation
Listening: Horacio Vaggione's *Points Critiques*, Microsound book examples, dictionary-based pursuit

Nov 19: Lecture: Rhythm in Electronic Music

Week 10 Interaction / Mixing and Mastering Audio

Nov 24: Introduction to controllers, MIDI, and OSC.

Nov 26: Lecture: The Art of Mixing and Mastering
Viewing and Listening

Optional Assignment: Read Chapter 9, "Sound mixing and monitoring" in *The Computer Music Tutorial*

Week 11

Nov 30-Dec 4: *Dead Week*; no class; prepare for final presentations

Week 12 Presentation of final projects

Dec 8: Summary of the course and final project presentations