Recorded Sound

Individual Projects In Computer Music - Terry Pender
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3 Credits
Mondays 1 to 4
Room 317, Prentis Hall
Office Hours: Tuesday, Wednesday 1 to 3.

Course Description
As music moves into the next millennium, we are continually confronted by the pervasive use of new music technologies. The world of music is changing rapidly as these technologies open and close doorways of possibility. An appreciation of this shifting technological environment is necessary for active listeners seeking a profound understanding of how music functions in our society. Furthermore, understanding how these technologies function is now almost essential for contemporary composers and theorists working to build an intellectual context for the creation of new musical art. This class will make use of the Columbia University Digital Recording Facility for all of the course work.

Class attendance is mandatory - you must attend class; there will be no make up sessions if you miss a day. Missing three classes will lower your final grade by one grade level. Assignments will be due when noted in this syllabus. Lecture notes will be available on the Web through Courseworks. You will be responsible for one final project due on 05/02/11. In addition, the class will work together on a re-creation of a classic Beatles recording.

TENTATIVE SYLLABUS

Week 1 - 01/24/11 – Introduction to the studio, signing up for studio time online, backing up files. Introduction to recording, digital sound fundamentals. The early days of recording – Thomas Edison, Bill Putnam, Les Paul and the art of innovation.
Discussion: Final Projects.
Harmonicats (Bill Putnam – Engineer), Good Morning Mister Echo (1951)
Bill Putnam.

**Assignment 1:** Watch Record Making with Duke Ellington and his Orchestra on Youtube.

**Week 2 – 01/31/11** - Early studio manipulation techniques.

**Aural/Historical References:**
Sonic Contours (1952) – Vladimir Ussachevsky – early tape manipulation
Jazz Et Jazz (1960) – Andre Hodeir – tape techniques plus jazz band
Poème électronique (1958) – Edgard Varese – early sound collage

**Assignment 2 due 02/07/11.**

1) Record several audio samples using an interesting sound source from around your apartment or studio.
2) Edit the samples, create fade ins and fade outs
3) Assemble the samples in Logic using it as a canvas for your sonic painting.
4) Apply basic audio volume and panning automation in Logic.
5) Create a **two-minute** Musique Concrète study.

Follow the instructions exactly.

**Week 3 – 02/07/11** – Signal Processing part 1
**Formal Principles:** Panorama, ambience, reverb and echo. Defining an aural sense of space and creating a virtual sonic world. Using Apple Loops – transposing, time-stretching, using the Global track, how to transpose, change time signature and key.

**Aural/Historical References:** Peg O’ My Heart (1948) – The Harmonicats (Bill Putnam) - first artistic use of reverb.
Telstar (1962) – The Tornados – Joe Meek’s strange new sounds,
Running Scared (1961) – Roy Orbison (EMT 140 Plate Reverb)
Snatch It Back and Hold It (1973) – Junior Wells – interesting panning.
Are You Experienced? and Third Stone From The Sun – Jimi Hendrix – innovative panning, backwards tracks, flanging.

Assignment 3 due 2/14/11.

1) Record and edit a new set of samples or use Apple Loops.
2) Process samples with various levels and types of reverb.
3) Create a composition that incorporates a creative use of panorama and then uses reverb and ambience to articulate structure and form.
4) The composition should be 2 minutes and 30 seconds long.

Week 4 – 02/14/11 - Basic mixing techniques. Using Logic’s Ultrabeat drum machine. Drum machine tricks and tips. Adding
Formal Principles: Recording the voice and the guitar. Should I record in mono or stereo? Common stereo microphone techniques.
Discussion – How to strike a realistic balance between your recorded tracks and sampled instruments and loops.
Aural/Historical References: It’s A Family Affair – first “hit” with a drum machine - Sly & The Family Stone
Assignment 3 – Proposal for Final Project - Proposal due on 02/21/11.

Week 5 – 02/21/11 - Microphone technique.
Formal Principles: Different types of microphones and their characteristics, microphone placement, finding the “sweet” spot, transients, proximity effect. Understanding your room and equipment, learning to get a variety of sounds from your setup.

Exercise

1) Record yourself or your instrument through as many different microphones as possible and analyze the results. Record the same piece of music using the same setup, distance from mic, same room,
same position, etc. Decide which mics make you sound best and how you can use each microphone to best effect.

2) With your favorite microphone, record yourself varying the distance from the mic, from extremely close – 1 to 2 inches, then 6 inches, 12 inches, 3 feet, and finally 6 feet away. Adjust the recording level appropriately each time you move the microphone further from the sound source. Examine the various timbres you get from your “room.” Now you can decide if you want more or less “room” sound in your recording.

3) Extend this experiment to the room where you record. Record in different places around the room, in the middle, in the corner facing the wall, etc. Listen carefully to the results and decide where in the room various instruments sound best.

Week 6 – 02/28/11 – Applying Equalization

Formal Principles: Types of EQs and how they’re used, determining the frequency content of a signal, common EQ settings, frequency charts. The ear, psychoacoustics and equalization – creating a sense of depth and motion with EQ. Multiband EQs, compressors and spectral processing.

Aural/Historical References:
Lucy In The Sky With Diamonds, Strawberry Fields, and Imagine – John Lennon
Ambient 2, The Plateaux of Mirrors /The Pearl – Brian Eno & Harold Budd
Halo – Porcupine Tree

Assignment 3 due 3/07/11.

1) Record an instrument with a fairly wide frequency range and a lot of overtones like the piano or acoustic guitar. Keep the music very simple and drone-like.

2) Bus or copy the sound to several other tracks, each with it’s own EQ allowing only a portion of the spectrum of the sound to pass.

3) Create 4 or 5 channels (bands) of the spectrum-separated sound and apply effects selectively so that each portion of the spectra has a different reverb or effects processing than the other portions of the sound.

4) Pan each channel appropriately to create a “new” version of your piano or guitar.

5) Experiment with Apples EVOC20 Filterband and TrackOscillator.
**Week 7** – 03/07/11 – Double-tracking.

**Formal Principles:** Doubling techniques. How to process doubled tracks and re-enforce a song’s structure through doubling. How automatic double tracking changes to flanging and then discreet echoes based on timing. Understanding slap-back echo, reinforcing your rhythm with echo, doubling a beat with echo.

**Aural/Historical References:**
Great Balls of Fire – Jerry Lee Lewis – slap-back echo.
The Big Hurt – Miss Toni Fisher (1959) – flanging.
Tomorrow Never Knows – The Beatles (1966) - flanging and pitch shifted tape loops, backwards guitar solo, lead vocal sung through the rotating speaker of a Hammond organ’s Leslie Cabinet, heavily compressed drums.
One Of These Days – Pink Floyd (1971) - echo builds and re-enforces the rhythm.
He Loved Him Madly – Miles Davis (1972) - interesting panned echo supports development and structure – early ambient jazz.
It’s Not Me – Santana (1977) - panned, slap back echo on guitar solo.

**Assignment 4 due 3/21/11**

1) Record to a click track so you can go back and overdub yourself.
2) Record a two repetitive patterns, one melodic, one rhythmic
3) Record several doubles – at least to 5.
4) Mix in a new double track on each repetition of the theme.
5) Apply appropriate pan and volume changes
6) Experiment with flanging a track.
7) Experiment with flanging an entire section of a finished mix.
8) Try different degrees of echo on the melodic track ranging from 15 to 50 milliseconds for an automated double-tracked effect.
9) Experiment with a synced echo on the rhythm track. Use echoes with dotted note values, such as a dotted eighth or dotted sixteenth note to add rhythmic excitement by creating echoes that fall in between the notes of your programmed or sampled drumbeat.

**Week 8** – 03/14/11 No Class – Winter Break
Week 9 – 03/21/11 – Introduction to synthesizers

**Formal Principles:** Common types of synthesis, AM, FM, additive, subtractive, Wavetable, and Granular. Automating synthesizer parameters.

**Aural/Historical References:**
- Occasional Variations – RCA MkIV, Milton Babbitt
- Stria (1977) – John Chowning (FM)
- Riverrun (1986) – Barry Truax (Granular)
- Kolyosa (1970) – Pril Smiley (Buchla Synthesizer)
- Supreme Balloon- Matmos
- Altibzz - Autechre

**Assignment 5 due 3/28/11**

1) Create a slow ambient composition that uses four synthesizer tracks.
2) Design four motifs, one for each track. Each motif should have a different, odd number of beats so that when looped their loop points are out of sync with each other but are otherwise playing in the same tempo.
3) Setup and automate some filter effects so that they change very slowly over the course of the composition.
4) Pan, process and set your four loops in motion to create a nice generative composition.

Week 10 – 03/28/11 – Creating Movie Soundtracks

**Formal Principles:** Importing movies into Logic, using Logic to compose music and then Soundtrack Pro to mix foley, dialogue, special effects and music together. Important criteria for composing background music for movies, radio, or TV.

**Visual/ Historical References:**
- M – Fritz Lang (1931) – Really thinking about how sound is integral to the storyline in this early sound film.
- The videos of Stan Brackhage, Robert Breer, and The Open Ended Group.
- Brian Eno – 77 Million Paintings

**Assignment 6 due - 04/04/11.**
1) Create a new four-minute film score/composition that is all background music, foley (natural everyday sounds), and special effects, but don’t use a movie. The sound will have to fully convey the action of this imaginary film. Pay particular attention to simple volume, panning, and EQ for movement and depth. How much auditory information can you include in the soundtrack to portray a sense of place, time, season, historical epoch, mood, temperament, etc.

2) Be creative and apply effects processing to some foley sounds as well as transposing and layering them. For example record the wind, transpose it up a third and a fifth and layer them together to create a major chord of harmonized wind.

3) Open the composition with a natural repetitive rhythm like a faucet dripping or a clock ticking and have it slowly evolve into the rhythm of the background music. Try to find a natural element that can become a musical element so the foreground and background meld together momentarily.

**Week 11 – 04/04/11 – All Together Now – The Beatles and the recording process.**

**Formal Principles:** Review of the use of effects and signal processing in several Beatles Songs. Learning to identify effects (electronic orchestration) and use them in Logic.

**Aural/Historical References:**
Misery – half speed overdubbed piano doubles electric guitar
I Feel Fine – early amplifier feedback on intro
In My Life – half-speed overdrubbing harpsichord over guitar solo to create a new timbre
Baby It’s You – the half speed overdrubbing using celeste and electric guitar
Yesterday – Early use of string quartet in a pop tune
She Said, She Said – backwards guitar
I’m Only Sleeping – reverse reverb and backwards guitar solo
Tomorrow Never Knows – flanging and the use of tape loops
Love To You – incorporation of exotic instruments
Rain – backwards vocals
Yellow Submarine – innovative panning and the use of sound effects
Strawberry Fields – mixing together two separate takes of a tune in two different keys.
Nowhere Man – guitar solo timbre created by playing two different guitars live through one amp (live doubling)
Revolution No. 9 – sound collage
Here Come The Sun – early commercial use of Moog Synthesizer

**Assignment 7 due 4/11/11** - (Based on Tomorrow Never Knows)
Listen to Björk’s Hidden Place, a contemporary composition based on this technique.

1) Create a new audio rhythm track.
2) Record the rhythm at a faster tempo than you intend to use it – say 150 bps. Also record a drone instrumental part to the temporarily up-tempo rhythm track.
3) Edit out a good 4 to 8 bar chunk and loop it.
4) Slow the track down to the correct tempo – say 120 bps by time stretching the loop.
5) Compress loop heavily and use it as the foundation for a new composition and perhaps as a source for side chained compression.

**Week 12** – 04/11/11 – The Art of the Re-mix. 3 Re-mix styles.
**Aural/Historical References:**
Fatboy Slim – Take Yo Praise, Camille Yarbrough – Praise You
Beth Orton and the Chemical Brothers – Where Do I Begin

**Assignment 8 due 04/25/11.**
Create a Re-Mix with the tracks provided in class or find your own. Use all of your production techniques and let your creativity run wild.

**Week 13** – 04/18/11 Adding something special to make a track stand out.
**Formal Principles:** Using aux tracks and busses to record processed sounds to their own tracks. EQing and reversing effects tracks. More processesing – Ring Modulation, Comb Filtering, Chorus, envelope followers, vocoders, and tuning (pitch correction) effects.
**Aural/Historical References:**
There Goes My Baby – The Drifters – first strings on an R&B song.
Come Out – Steve Reich – Phasing tape recorders (loops).
Feel Flows – The Beach Boys – reverse reverb on lead vocals.
Good Vibrations – brilliant production, use of Theremin.
Riders On The Storm – creepy whispered vocal double-track.
No One Receiving – Brian Eno – reverse reverb on vocals.
You Shook Me & The Wanton Song – Led Zeppelin – reverse echo on guitar solo.
Mantra - Karlheinz Stockhausen – ring modulation.
On The Way Home To Earth – John McLaughlin - ring modulation on guitar solo.
Night Traffic – Paul Lansky – comb-filtered highway traffic.
For The Love Of Money – O’Jays – phase shifted bass and reverse reverb on background vocals.
Send Me Your Love – Stevie Wonder – vocoder
Mr. Blue Sky – ELO - vocoder
Wait It Out – Imogen Heap - vocoder
Believe – Cher – pitch correction effects.

**Week 14** – 04/25/11 – Mixing and Mastering.
**Formal Principles:** A basic mixing method for both movies and music. The difference between mixing and mastering and how to achieve your goals. Special mastering tools in Logic and how to use them.
**Visual/Historical References:**
Abbey Road – The Beatles
Dark Side Of The Moon – Pink Floyd
Owner Of A Lonely Heart – Yes – London “perspective” style of mixing.
**Discussion:** How to get heard in an iPod society. Ideas on making money and getting exposure.

**Final Exam** – 05/02/11 - **Final projects due.** We will listen to all final projects in class.