

Electronic Studio (MUS4203)

Spring 2019 Syllabus

Dr. Ben Johansen
McCrary Music Building, 233
B_Johansen (email)

[Meeting Time/Place]

1:25-2:15pm Mon/Wed in Alinea ([Marrs McLean Science Building Room 330](#)).

[Required Attendance Outside of Scheduled Class Time]

None.

[Course Objectives]

By the end of this course, you will be able to:

- List various forms of electroacoustic music along with historical examples.
- Perform basic electroacoustic music analysis.
- Identify and describe foundational/basic digital signal processing (DSP) tools.
- Creatively manipulate recorded sounds to fit your compositional objectives using DSP tools.
- Develop code to use in live electroacoustic music performance.
- Create an original electronic music complete with edited score(s) and parts (if applicable).

[Course Materials]

Resources (patches, readings, etc.) can be accessed here:

<https://baylor.box.com/v/mus4203> (available only to students in this course)

Library Listening Reserves = <https://baylor.box.com/s/631s4tyynt5xy3m71mf7o1rbfaad1kd9>

[Grading]

Engage with technology.

Take risks with technology.

Search and be curious.

25% - Class Attendance

25% - Listening and Reading Assignments

50% - Projects

A = 90-100	B = 83-86	C+ = 77-79	C- = 70-72
B+ = 87-89	B- = 80-82	C = 73-76	F = 0-69

[Schedule] TBD

Mon01/14 Intro to Class and Alinea; Assign Project #01
 Wed01/16 Intro to how Digital Audio works
Mon01/21 NO CLASS (Martin Luther King, Jr. Day)
 Wed01/23 Project#02 and Reading Assignment #01 Due
 Mon01/28 Project#03 and Listening Assignment #01 Due
 Wed01/30 answer questions (touch base on Project#04)
 Mon02/04 Project#04 due
 Wed02/06
 Mon02/11
 Wed02/13
 Mon02/18
 Wed02/20
 Mon02/25
 Wed02/27
 Mon03/04
 Wed03/06
03/11-15 NO CLASS (Spring Break)
 Mon03/18
 Wed03/20
 Mon03/25
 Wed03/27
 Mon04/01
 Wed04/03
 Mon04/08
Tue04/09 NO CLASS (Diadeloso)
 Wed04/10
 Mon04/15
 Wed04/17
Mon04/22 NO CLASS (Easter)
 Wed04/24
 Mon04/29
 Wed05/01

[Attendance]

The following is straight from the School of Music Undergraduate Handbook (I made the last sentence red):

School of Music policy requires that to earn credit in a course a student must be officially enrolled by the end of the second full week of the semester and attend at least 75% of all class meetings. Faculty members may establish additional attendance requirements as outlined in course syllabi. Any student who is not present for at least 75% of the scheduled class sessions for any course will automatically receive a grade of "F" in the course. Any University-related activity necessitating an absence from class **will count** as an absence when determining whether a student has attended the required 75% of class meetings.

[Academic Success]

We as faculty members have high academic expectations of you and believe every student who has been admitted to Baylor can be successful. I am a vigilant professor and will notice if you are struggling in my course. If your academic performance in this class is substandard, I will submit an Academic Progress Report to the Success Center during the sixth week of the semester. I will work to help you get the help you need to learn more fully, and I can assist you in finding the resources you need beyond my course. Familiarize yourself with the culture of success we have at Baylor by stopping by the Paul L. Foster Success Center in Sid Richardson or by going to: <http://www.baylor.edu/successcenter/>. Even if you don't need help, you can get involved by tutoring other students in the future or by telling a hall mate how and where to get help.

[Academic Integrity]

Plagiarism or any form of cheating involves a breach of student-teacher trust. This means that any work submitted under your name is expected to be your own, neither composed by anyone else as a whole or in part, nor handed over to another person for complete or partial revision. Be sure to document all ideas that are not your own. Instances of plagiarism or any other act of academic dishonesty will be reported to the Honor Council and may result in failure of the course. Not understanding plagiarism is not an excuse. As a Baylor student, I expect you to be intimately familiar with the Honor Code at: <http://www.baylor.edu/honorcode/>

[Students Needing Accommodations]

Any student who needs academic accommodations related to a documented disability should inform me immediately at the beginning of the semester. You are required to obtain appropriate documentation and information regarding accommodations from the Office of Access and Learning Accommodation (OALA). Contact Information: (254) 710-3605 - Paul L. Foster Success Center, 1st floor on the East Wing of Sid Richardson.

[Baylor University Title IX]

Sexual and Gender-Based Harassment and Interpersonal Violence Policy

Baylor University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities, and it does not tolerate discrimination or harassment on the basis of sex or gender. This policy prohibits sexual and gender-based harassment, sexual assault, sexual exploitation, stalking, intimate partner violence, and retaliation (collectively referred to as prohibited conduct). For more information on how to report or to learn more about our policy and process, please visit www.baylor.edu/titleix. You may also contact the Title IX Office directly by phone, (254) 710-8454, or email, TitleIX_Coordinator@baylor.edu.

The Title IX office understands the sensitive nature of these situations and can provide information about available on- and off-campus resources, such as counseling and psychological services, medical treatment, academic support, university housing, and other forms of assistance that may be available. Staff members at the office can also explain your rights and procedural options if you contact the Title IX Office. You will not be required to share your experience.

If you or someone you know feels unsafe or may be in imminent danger, please call the Baylor Police Department (254-710-2222) or Waco Police Department (9-1-1) immediately.

[Military Student Advisory]

Veterans and active duty military personnel are welcomed and encouraged to communicate, in advance if possible, any special circumstances (e.g., upcoming deployment, drill requirements, disability accommodations). You are also encouraged to visit the VETS Program Office with any questions at (254) 710-7264.

Project #01

- during Wednesday's class you will be required to demonstrate that you can record into the computer using MIOConsole3d, Metric Halo interface(s), and Logic
 - helpful link = baylor.edu/music/alinea
- record an amazing sound outside of Alinea (on any device), edit it in Izotope RX and share it with the class by playing it through Izotope RX (using MIOConsole3d and studio speakers)
 - helpful link = <https://www.izotope.com/en/learn/products/rx.html>

Reading Assignment #01

- [Composing Electronic Music by Curtis Roads \(New York: Oxford University Press, 2015\)](#)
 - Chapter 1 - The Electronic Medium [listen to all examples]
 - Chapter 2 - Aesthetic Foundations [listen to all examples]
- helpful resources from class on How Digital Audio Works:
 - <https://www.acs.psu.edu/drussell/Demos/waves-intro/waves-intro.html>
 - https://docs.cycling74.com/max7/tutorials/02_mspdigitalaudio
 - <https://www.xiph.org/video/vid1.shtml>

Project #02

- keep a sound diary
- complete at least 10 exercises from R. Murray Schafer's [A Sound Education](#) (found in the "Readings" folder in <https://baylor.box.com/v/mus4203>)
- share your experiences with the class (bring your diary - no one will see it but you)

Project #03

- using one sound you recorded (either from Project#01 or newly recorded), create a 30sec piece (no more, no less ... cut it to exactly 30 seconds!)
- only use one plugin (manipulation techniques) to its absolute fullest
- learn everything you can about the plugin (read the help files and research using other resources) and share with the class what you've learned

[Listening Assignment #01 on next page]

Listening Assignment #01

- Listen to TWO entire pieces from the following website:
 - <http://ezproxy.baylor.edu/login?url=https://electrotheque.com/>
- the following table ([from this paper by Leon W. Crouch III](#)) may help you think about what you are hearing in discussable terms

TABLE 1: Fundamental Parameters^{vi}

DOMAIN	PARAMETER	CONTINUUM
Time	Temporal Progression	Continuous <-----> Disjunct
	Rhythm	Pulsed <-----> Non-pulsed
Texture	Vertical Density	Thick <-----> Thin
	Horizontal Density	Busy <-----> Sparse
Amplitude	Dynamics	Loud <-----> Soft
	Attack and Release	Sharp <-----> Gradual
Frequency	Pitch	Pitched <-----> Non-pitched
	Range (and Tessitura)	Narrow <-----> Wide
Location ^{vii}	Distance	Close <-----> Far
	Direction	Horizontal -180° <-----> 180° Vertical -180° <-----> 180°

Project #04**Create a 1min fixed media piece in any DAW of your choice**

- Read through [Russell Drake's How to Make Electronic Music](#)
- Draft a plan (form, concept, idea, trajectory, etc.) that will help you begin
 - share the plan with the class along with completed 1min piece
- Bring in material from work you do in other audio programs (other DAWs, Max, Pure Data, SPEAR, SoundHack, Cecilia, etc.)

★ here are some examples of short electroacoustic works:

- ☆ 3min pieces = <http://ezproxy.baylor.edu/login?url=https://electrotheque.com/album/2408>
- ☆ 1min pieces = "60x60" in this folder = <https://baylor.box.com/s/631s4tyynt5xy3m71mf7o1rbfaad1kd9>

Project #05

Polyphonic Synthesizer in Max

- [follow this tutorial](#) to create a polyphonic synthesizer in Max
- attempt to:
 - add the ability to change the ADSR envelop
 - add panning to each pitch (lower notes pan further left and higher notes pan further right)
- record the output into a sound file saved onto the hard drive
- ★ additionally, search through Max projects and find one you want to show the class (something that aligns with your interests) = <https://cycling74.com/projects>
- ★ [here is an optional synthesis video to watch](#)

CUT

CUT

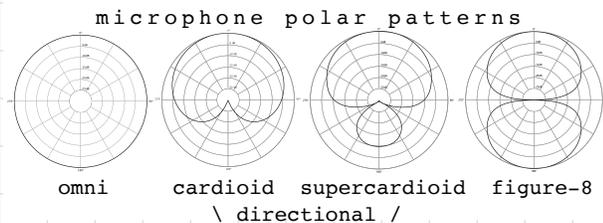
CUT

Sound Reinforcement: a creative task! there is no right way!

- resource = Shure publication "Audio Systems Guide for Music Educators"
- when powering up = turn amplifiers (powered speakers) on LAST and off FIRST
- describing sound waves = frequency, wavelength, amplitude, envelope (ADSR), harmonic content

Parts of the system (in order from performer's mouth or instrument ==> audience)

1. mic
2. channel strip (top to bottom = signal path)
 - A. preamp = boosts mic level to line level
 - B. EQ = shapes tone
 - C. auxiliary sends = additional outputs
→ (to stage monitors for example)
 - D. fader = adjust channel line level volume
 - E. pan
3. main output



4. amplifier = boosts signal from line level to very high levels designed for passive speakers ONLY
 - active (powered) speakers have amplifiers built into them
 - some mixers have amplifiers built in (called power mixers) and are sold along with passive speakers
5. loudspeakers (active or passive "main" speakers)

Effects processors:

- compressors/limiters = boost quiet sounds and attenuate loud sounds (keep distortion from occurring further down signal chain)
- special effects processors = add ambience (reverb), flange, delay, distortion, etc.

FOLD

- feedback = mic too close to PA speaker, mic too far from source being amplified, and/or too many mics
 - directional mics help minimize feedback by isolating sounds being picked up
 - rooms with less hard surfaces have fewer feedback issues ... no or full audience is very different too
- mic placement (requires experimentation and adjustment)
 - get the microphone as close to the source as possible (allows for max sound level before feedback)
- use a spectral analyzer = identify feedback frequencies and fine tune EQ

Setup system and run sound check (proper gain structure):

1. turn off amplifiers (main speakers and stage monitors)
2. set channel faders and main outs to Unity (0dB) and preamp gain knob to lowest setting
3. with headphones, set proper gain structure for each channel:
 1. press PFL/SOLO button on the channel
 2. engage HPF if source has no low end (always engage for vocals)
 3. slowly bring up preamp gain knob as performer sounds into the mic to find "Goldilocks" setting = between noise floor and distortion (clipping) ... usually with the loudest sound peaking on the VU meter around Unity (0dB) or 2/3 of full scale
 - too low requires a boost further down the signal chain (which raises the noise floor)
 - too high allows for periodic distortion (clipping) ... going into the "red"
4. after all channels have been setup individually, have everyone perform together
 - with volume knob of amplifiers (main speakers and stage monitors) turned all the way down, slowly turn up volume knobs on amplifiers until you reach the desired volume in the space

Additional concepts to research and work on: mic 3-to-1 rule, using EQ to shape tone and prevent feedback, wireless mics, DI boxes, in-ear monitors, power management, using digital mixing boards,

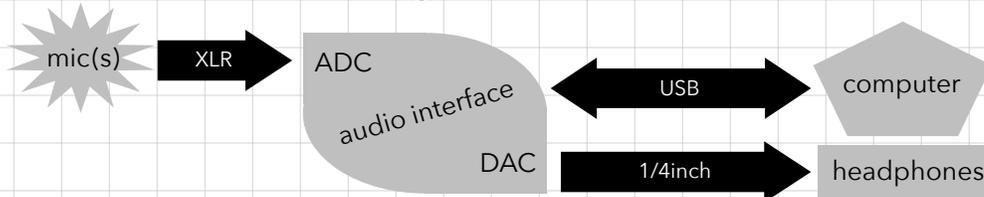
CUT

CUT

CUT

CUT

Sound Recording: a creative task! there is no right way!



Mic Placement (requires experimentation and adjustment)

- mono (single) mic individual instruments:
 - instruments need a certain distance from mic to create character and timbre
- stereo (two) mic ensemble or solo performance = **experiment with different stereo mic techniques!**
 - closer for less of the room's natural reverberation sound
 - further away for more of the room's natural reverberation sound
 - the further your mic is away from your source, the more preamp gain you need, and thus you end up raising your noise floor
 - classical music stereo mic placement = 4-20 feet away and 7-10 feet above performers' floor level

Audio Interface

- sample rate = number of times per second that the signal voltage is measured
 - use 44.1kHz or 96kHz for recording audio alone
 - use 48kHz for recording audio to sync with video
- bit depth = use 24 bit = this is the resolution at which the amplitude of the signal voltage is measured

FOLD

Gain Structure = finding the Goldilocks setting (utilizing the full resolution you have)

- slowly bring up preamp gain knob as performer sounds into the mic to find "Goldilocks" setting = between noise floor and distortion (clipping) ... usually with the loudest sound peaking on the VU meter around Unity (0dB) or 2/3 of full scale
 - too low requires a boost further down the signal chain (which raises the noise floor)
 - too high allows for periodic distortion (clipping ... going into the "red")
 - give yourself enough headroom so unanticipated loud dynamics do not clip

Computer

- lossless audio files (WAV, AIFF, CAF) = highest quality
 - use through entire recording/editing process (note different maximum size for each ... and make sure your DAW is setup to record unlimited time)
- lossy audio files (MP3, AAC, OGG) = these discard data in order to compress and save space
 - save as lossy ONLY when you are completely done with all editing and are ready to stream online (in which case use CBR) or to save space on a device (in which case VBR is better)
- bit rate = amount of data (bits) required to represent one second of audio
 - bit rate = bits per sample (bit depth) × samples per second (sample rate) × number of channels
 - bit rate of CD quality ==> 1411.2kbps = 44,100 × 16 × 2 (4min song would be 40MB)
- tips:

• turn off all notifications and wifi	• use a dedicated audio recorder like a Zoom or Sound Devices
• close any unnecessary programs	• format media cards in the device
• disable auto updates	• use a backup recorder
• use caffeine app	

CUT

CUT

CUT

CUT

Audio Editing:

Record at a quality as close to what you want for a final mix as possible (spend time getting mic placement, room acoustics, preamp gains, etc. perfect!). Don't ever say you'll wait to make something better at a later stage. You can only do so much with bad raw material. Use reference quality (flat frequency response) earphones and monitor speakers in your editing.

MULTITRACK RECORD → MIX → MASTER → DISTRIBUTE

MIX (VERTICAL): put all the tracks of a single song together

1. Amplitude
 - Volume and panning automation (also envelopes such as fade in, fade out)
 - Dynamics Processing: [Compressor](#)/Limiter, Expander (ex. noise gate), Normalize
2. Frequency
 - Equalization (high pass, low pass, low shelf, high shelf, peak filter, notch filter)
3. Time = combine the original audio signal with delayed and modified copies of itself
 - Delay, Flange, Chorus
 - Reverb (convolution = make audio *sound* like it is in a specific hall or going through hardware)

MASTER (HORIZONTAL): fine tune each completed song to fit best with all other songs in an album

1. Slight adjustments to EQ, compression, limiting, stereo image, and reverb
2. Spacing and fades are added to the beginning and ending of each song
3. Make each song able to sound well played on any device

FOLD

Computer

- lossless audio files (WAV, AIFF, FLAC, CAF) = highest quality
 - use through entire recording/editing process (note different maximum size for each ... and make sure your DAW is setup to record unlimited time)
- lossy audio files (MP3, AAC, OGG) = these discard data in order to compress and save space
 - save as lossy **ONLY** when you are completely done with all editing and are ready to stream online (in which case use CBR) or to save space on a device (in which case VBR is better)
- bit rate = amount of data (bits) required to represent one second of audio (higher bit rate = better quality)

Destructive vs. Non-destructive editing:

1. Destructive = changing the actual audio file
 - Most processes performed in an "audio file editor" (normalizing the audio file, for example)
 - Time stretch & pitch shift (but DAWs invisibly create new files so original audio files is not changed)
2. Non-destructive = just changing how the software reads the original audio file
 - Edits done to "regions" in the main timeline of the DAW (Cut, copy/paste)
 - Run audio through DSP (plugins)

CUT