Audio for Digital Games

GAMES-UT 212; GAMES-GT 212
Fall 2021
NYU | Tisch School of the Arts | NYU Game Center

Course Description

Audio for Digital Games is an introduction to creating, critiquing, and implementing the various types of audio content & systems used in digital games. Students will author a broad variety of audio: from sound effects, to recorded voice over, to environmental ambiance. The course will emphasize techniques for creating and critiquing audio in service of achieving design and/or storytelling goals.

The class meets at the following times and locations:
Lectures: Mondays, 5:00 pm to 7:40 pm EDT
Labs: Wednesdays, 5:00 pm to 7:40 pm EDT

The class location is **2 Metrotech Center, Room 811.**
If we cannot meet in person, class will be conducted over Zoom. Check the class Slack for updates and Zoom links.

The class github, which includes helpful links, sample projects, and this syllabus, is available at https://github.com/8ude/UG212_AudioForGames_Fall21

Course Objectives

At the completion of this course, the student will be able to:
- Develop and achieve a unique sonic aesthetic for their games
- Create audio using a variety of techniques, from foley sound effects to voice over
- Utilize a variety of digital audio workstations, tools, and interactive audio engines
- Critique game audio using industry standard terminology
- Understand audio design's vital role in enhancing and supporting the mechanics of digital games
- Identify and remedy issues in games that result from improper use of audio
- Contextualize audio creation in the broader history of game audio
- Understand the core concepts behind digital audio and audio synthesis

Course Format

Audio for digital games focuses on project-based learning. Weekly meetings consist of a two-hour lecture class, which will consist of demos, lectures, critical play, listening exercises & critical feedback sessions, and a three-hour lab, in which students can work with assistance & hands-on technical instruction from the instructor.

Prerequisites

Students should be familiar with Unity or another contemporary 3D game engine & capable of basic scripting. Students who have completed an introductory digital studio class will be adequately prepared. Other students may join at the professor's discretion. No prior musical experience is necessary.

Required Equipment

There are no required textbooks for this course (a few books will be recommended for the curious and/or those interested in further technical study). However, the following pieces of equipment will be required:

Over-ear headphones:

Recommendation: Sony MDR7506 (~$90) or Audio Technica ATH-M20x (~$50)

Microphone (optional):

Shure MV5 (~$100) or Zoom H1n ($100)

Software:

We will be using the following software in this course:

Adobe Audition (provided with NYU Account)
Reaper ($60, though with a generous trial version)
Unity (free for personal version)
FMOD Studio (free for education and low-budget games)

Attendance

Attending and arriving on time to all class sessions is required and expected. For the purposes of remote classes, this means that your camera is on. This includes all labs, recitations, and critiques. If you will be missing a class due to illness, or unavoidable personal circumstances, you must notify your professor in advance via email for the absence to be excused. The same applies for turning the camera off during class.

Unexcused absences and being late to class will lower your final grade. Three unexcused absences lower your final grade by a letter. Each subsequent unexcused absence will lower another letter grade. Two tardies will count as one unexcused absence. Arriving more than 15 minutes late to class will also count as an unexcused absence.

Safety and Health

All students attending the class are supposed to follow the protocols as described by the NYU Returns plan, including having been vaccinated and filling out the daily screener. https://www.nyu.edu/life/safety-health-wellness/coronavirus-information.html

- Always wear a mask covering their face and nose during the classroom.
- Keep social distancing as much as possible during the class session.
- Eating in the classroom will not be allowed for health and safety reasons; it is allowed to lower your mask for a brief moment to sip from a beverage. This is in compliance with the NYU protocols for eating and drinking on campus https://www.nyu.edu/life/safety-health-wellness/coronavirus-information/campus-life/eating-and-drinking-on-campus.html
- If you feel sick, please stay home and notify the instructor. If you experience any COVID symptoms (see https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html), or have been in close contact with someone who have tested positive for COVID, please get tested as soon as possible and use the COVID-19 Reporting form https://nyu.qualtrics.com/jfe/form/SV_bCvIk6DpqWeFsJT

Statement of Academic Integrity

Plagiarism is presenting someone else's work as though it were your own. More specifically, plagiarism is to present as your own:

- a sequence of words quoted without quotation marks from another writer
- a paraphrased passage from another writer's work
- facts, ideas, sounds, or images composed by someone else

Accessibility

Academic accommodations are available for students with documented disabilities. Please contact the Moses Center for Students with Disabilities at 212 998-4980 for further information.

Counseling and Wellness

Your health and safety are a priority at NYU. If you experience any health or mental health issues during this course, we encourage you to utilize the support services of the 24/7 NYU Wellness Exchange 212-443-9999. Also, all students who may require an academic accommodation due to a qualified disability, physical or mental, please register with the Moses Center 212-998-4980. Please let your instructor know if you need help connecting to these resources.

Title IX Statement

Tisch School of the Arts is dedicated to providing its students with a learning environment that is rigorous, respectful, supportive and nurturing so that they can engage in the free exchange of ideas and commit themselves fully to the study of their discipline. To that end, Tisch is

committed to enforcing University policies prohibiting all forms of sexual misconduct as well as discrimini\ation on the basis of sex and gender.

Detailed information regarding these policies and the resources that are available to students through the Title IX office can be found by using the following link:
https://www.nyu.edu/about/policies-guidelines-compliance/equal-opportunity/title9.html

Grading

Assignments will be evaluated with special attention paid to:

Comprehension & Application - Does the assignment reflect an understanding of the concepts covered in class? Does it follow rules or guidelines outlined in class? If not, does it intentionally & meaningfully subvert these rules?
Sound Quality - Does the sonic quality of the assignment aide in achieving its stated creative goals? Is it free from distracting or otherwise out-of-place sonic elements & artifacts?
Cohesion - Does the audio mesh with the other game elements, visual, mechanical, or otherwise? Do they meaningfully complicate or compliment the work? Are the sounds appropriate for the interaction in context?
Creativity - Does the work represent a unique perspective? Is it innovative & unique either in its execution or juxtaposition?

Grade Calculation

Students will be given grades based on a 100-point scale. Each assignment will be graded on a point scale, and these points will be added up to determine the final grade, according to the following:

92-100	A
90-91	A-
88-89	B+
82-87	B
etc.	

The following are the components of the grade:

20% Participation & In-class preparedness:
The student receives 2 participation points per day.
This is reduced to 1 if the student doesn't participate in critiques or assignments, and reduced to 0 if they are absent.
50% Weekly Assignments, graded on a 10-point scale (due dates subject to change - check class slack and github for updates):

Assignment	Assigned Date	Due Date

Active Listening (presentation)	Sep 8 (Week 1)	Week Varies, In Class
Sound Collage	Sep 13 (Week 2 Lecture)	Sep 21 (Week 3 Lecture)
Spell Sound	Sep 20 (Week 3 Lecture)	Sep 27 (Week 4 Lecture)
Scene Re-sound	Sep 27 (Week 4 Lecture)	Oct 4 (Week 5 Lecture)
Recorded Re-sound	October 5 (Week 5 Lecture)	October 12 (Week 6 Lecture)
3D Sound Space	November 2 (Week 10 Lecture)	November 9 (Week 11 Lecture)
Music Loops	November 9 (Week 11 Lecture)	November 16 (Week 12 Lecture)

30% Projects (due dates also subject to change)

Project	**Assigned Date**	**Due Date**
2D Sonic Reskin	October 12 (Week 6 Lecture, occurs on a Tuesday)	Part 1: October 18 (Week 7 lecture) Part 2: October 25 (Week 8 Lecture)
3D Sonic Reskin	October 25 (Week 8 Lecture)	November 8 (Week 10 Lecture)
Final Project (Audio Only Game)	November 11 (Week 11 Lab)	December 13 (Week 15 Lecture)

Late work policy: Assignments may be turned in late with no penalty. Bear in mind that I won't provide feedback on late submissions without an extension. I will accept late assignments until December 20th.

Schedule

Subject to change - check class Slack and Github regularly!

Week 1 - Basics of Digital Audio 1 - The Building Blocks of Sound

(Adobe Audition, Reaper)

- Definition of Sound
- Role of Audio in the Game Development Process
- Anatomy of a Sound

Assignment

Readings: Jack Schaedler - Seeing Circles Signs & Signals: "Intro, Signals & Sound" & "Sines & Sampling"
Listening: Tristan Perich - One Bit Symphony (at least Mvmt 1. Turn your volume down!)

Audio Analysis Presentation - with a partner, play a game from the provided list, or make a case for a different game (if at all possible, play on original hardware), and analyze the audio design of the game.

You will be presenting a brief (~5 minute) presentation at some point in the semester.

Week 2 - Basics of Digital Audio 2 - Sound and Scene

(Audition, Reaper)

- Navigating Reaper
- Assembling and Manipulating Audio in a DAW
- Frequency Content & FFT
- EQ & Basics of Digital Signal Processing

Assignment

Reading - Cage, John - lecture on nothing
Listening - Art Ensemble of Chicago - *Illistrum*
Sound Collage - Create a 3-5 minute sound story (whatever that means to you) using samples sourced from the Audio for Digital Games Library, Freesound.org, and/or things that you record yourself (including your own voice!). Experiment with different sample rates, bit depths, and using filters and EQ.

Week 3 - Sculpting Sound - Synthesis and FX

(Reaper)

- Synthesis Techniques - Subtractive, FM, Granular, Wavetable, Modular
- FX, plugins, and creative techniques
- Layering sounds

Assignment

Listening - SOPHIE - Product
Spell Effects - Choose two of the provided gifs of spell effects and re-design the sounds. Work with multiple layers using a combination of synthesized sounds, samples, and FX. Each sound should have at least five layers, two of which should be synthesized.

Week 4 - Microphones and Signals

(REAPER)

- Mic'ing and Signal Flow
- Types of Microphones
- Recording Spaces - Indoor and Outdoor Best Practices
- Volume Levels

Assignment

Listening/Viewing: Oliveros, Pauline - *Deep Listening* (album+ted talk)

Field recording - take your favorite sound from the last assignment. Using only your recording device (this could be your phone), FX, and objects at your disposal, try to re-create that sound.

Week 5 - Sound As A Character

(REAPER)

- Audio in Games, Audio in Music, Audio in Cinematic Forms
- Psychoacoustics and audio illusions
- Using FX and automation

Assignment

Listening: Maryanne Amacher - Sound Characters
Audio-Visual Synchrony - You will be provided 3 longer gameplay captures. Complete the Foley sound and ambience for these gifs using techniques you've learned in the past 4 weeks, with a combination of sampling, synthesis, and/or recording.

Week 6 - Unity Audio 1: Sound as Gameplay Signifier

(REAPER, UNITY)

- Sound Design & Game Feel
- Basics of Sound Assets and Audio Sources
- Audio Scripting in Unity

Project 1: 2D Sound Reskin

Part A: You will be given a feature-complete 2D game that's completely silent. It's up to you to provide audio for each of the actions in the game, as well as environmental ambience (you may also create music for the game, but this is not required). You may alter the code as you wish if it helps you achieve your vision for the game audio, but no scripting is required for this assignment.

Week 7 - Unity Audio 2: Aesthetics and Constraints

(Reaper, Unity)

- Audio Aesthetics
- Real time mixers - snapshots, FX and sidechaining
- Games without Visuals - Playing by Sound

Project 1: 2D Sound Reskin

Part B: Your lead designer has evaluated the game, and wants to go in a different sonic direction. You now must re-create all of the audio in the game, using only the samples or methods personally assigned to you.

Week 8 - FMOD 1 - Connecting and Navigating Middleware

(Unity, FMOD)

- Middleware overview
- Connecting FMOD to Unity

Project 2: 3D Sound Reskin

You will be given a 3D game with an associated FMOD project, but all the audio is removed. As with the 2D reskin, create the audio for this experience, paying special attention to how the sound is reinforcing a sense of space.

Week 9 - FMOD 2 - Parameters, FX, and Automation

(Reaper, Unity, FMOD)

- Reverb, Delay
- Creating a Shared Sonic Space
- Panning, Surround, & Spatialization
- 3D Sound

Project 2: 3D Sound Reskin

Continue work on the 3D Sound Reskin

Week 10 - 3D Audio - Spatial Sonic Storytelling

(Reaper, FMOD, Unity)

- Adding Steam Audio to FMOD
- Types of Reverb and Spatial Audio
- Audio Occlusion, HRTF, and VR considerations

Listening/viewing: Zimoun - Compilation Video 3.9; Camile Norment - Rapture; Susan Philipsz - Lowlands

Assignment

3D Sound Space - Using Steam Audio, FMOD, and whatever sound effects you wish, create a sonic environment that includes at least 5 sources, some type of audio occlusion, and at least 3 distinct reverb spaces.

Week 11 - Music 1

(Reaper, FMOD, Unity)

- Retro Game Music Tools (trackers and sound fonts)
- Interactive Music in FMOD
- Basics of music creation and theory
- The MIDI protocol
- Introduce Final Project

Assignment

Viewing: David Kanaga - Music Object, Substance, Organism

Music Loop - Create 2 music loops. In FMOD, create an interactive music event that demonstrates both “horizontal” and “vertical” interactive music transitions.

Final Project

Prototype a game that has no visual feedback, in which the player must rely solely on audio cues in order to succeed. This can be any type of game you wish, so long as it is audio only**. Up to 4 people can work in a group on this project.

**I may make exceptions for audio-focused games that aren’t 100% audio-only, but audio should be the primary sense for player feedback!

Week 12 - Music 2

(Reaper, FMOD, Unity)

- How to source and commission music
- Interactive Music in FMOD
- Basics of music creation and theory
- The MIDI protocol

Assignment - Work on Final Project

Prototype a game that has no visual feedback, in which the player must rely solely on audio cues in order to succeed. This can be any type of game you wish, so long as it is audio only**. Up to 4 people can work in a group on this project.

**I may make exceptions for audio-focused games that aren't 100% audio-only, but audio should be the primary sense for player feedback!

Week 13 - Voice Over

(Reaper, Unity, FMOD)

- Vocal Performance
- Casting & Auditions
- Directing Voice Actors
- Preparing & Integrating Voice Over

Assignment (to be completed during lab time)

Voice Over Reskin - You will be given a script and a game with an audio manager (similar to our other reskin project). Record the 10 lines of voice over, either by yourself or directing a performer, and integrate them into the game.

Final Project Review 1

We'll review your final assignments during lab, providing feedback before the final due date, which is Dec 13th.

Week 14 - Advanced Topics

(Reaper, Unity, FMOD)

- DSP and the Audio Buffer
- Uses for Machine Learning in Game Audio

Final Project Review 2

We'll review your final assignments in class, providing feedback before their final due date, which is Dec 13th.

Week 15 - Final Project Review

- Lecture time will be devoted to last-minute critiques and project assistance.
- We will review and present final projects during the Lecture session of this week (December 13th)

Final Assignment Due

Be prepared to show your final project in class on Dec 13th