# Unbounded Innovation Lab Music Composition and Procedural Audio for Video Games Curriculum

Welcome to Unbounded Research and Development! Over the course of this 6-month mentorship program, we will guide you through a transformative journey in which you will learn about computer graphics, research methodology, shader programming, and AI, while also writing and publishing research papers. Below is a detailed outline of your week-by-week journey during this program.

# Table of Contents

# Core Instruction

## Week 1: Introduction to Video Game Music Composition

### Activities

- Program orientation and introduction to the course structure
- Setting up the computer environment (installing necessary software and tools)
- Lecture and discussion on the fundamentals of game development
- Meeting your team members
- Introducing the mentors and their roles
- Introduction to video game music history and evolution
- Analyzing popular video game soundtracks
- Basic music theory and composition techniques

### Learning Outcomes

- Understand the role of music in video games
- Recognize different styles and genres of video game music
- Learn basic music theory concepts
- Set up their environment (connect to remote desktop virtual machine)

### Deliverables

- Written reflection on the importance of music in video games
- Short composition using basic music theory concepts

## Week 2: Digital Audio Workstations (DAWs) and MIDI

### Activities:

- Introduction to DAWs and MIDI
- Exploring different DAWs (e.g., FL Studio, Ableton Live, Logic Pro)
- Hands-on practice with a chosen DAW

### Learning Outcomes:

- Understand the role of DAWs and MIDI in music production
- Learn the basics of a chosen DAW
- Create simple melodies and rhythms using MIDI

### Deliverables:

- Short composition created using a chosen DAW and MIDI

# Week 3: Sound Design and Synthesis

### Activities:

- Introduction to sound design and synthesis
- Exploring different types of synthesizers (e.g., subtractive, FM, wavetable)
- Hands-on practice with synthesizers in a chosen DAW

### Learning Outcomes:

- Understand the basics of sound design and synthesis
- Learn how to create custom sounds using synthesizers
- Apply sound design techniques to video game music composition

### Deliverables:

- Short composition featuring custom sounds created using synthesizers

# Week 4: Procedural Music and Interactive Audio

### Activities:

- Introduction to procedural music and interactive audio
- Analyzing examples of procedural music in video games
- Experimenting with procedural music techniques in a chosen DAW

### Learning Outcomes:

- Understand the concepts of procedural music and interactive audio
- Learn how to create adaptive music for video games
- Apply procedural music techniques to video game music composition

### Deliverables:

- Short composition demonstrating procedural music techniques

# Week 5: Meta Sounds and Sound Effects

### Activities:

- Introduction to meta sounds and sound effects
- Analyzing examples of meta sounds in video games
- Creating sound effects and meta sounds using a chosen DAW

### Learning Outcomes:

- Understand the role of meta sounds and sound effects in video games
- Learn how to create custom sound effects and meta sounds
- Apply sound design techniques to video game music composition

### Deliverables:

- Collection of custom sound effects and meta sounds

## Week 6: Implementing Music and Sound in Game Engines

### Activities:

- Introduction to game engines (e.g., Unity, Unreal Engine)
- Implementing music and sound effects in a game engine
- Hands-on practice with a chosen game engine

### Learning Outcomes:

- Understand the basics of game engines and their role in video game development
- Learn how to implement music and sound effects in a game engine
- Apply music and sound implementation techniques to video game development

### Deliverables:

- Simple game prototype featuring custom music and sound effects

## Week 7: Collaboration with Game Developers

### Activities:

- Introduction to the game development process
- Collaborating with game developers to create music and sound for a game project
- Implementing music and sound in a game project

### Learning Outcomes:

- Understand the game development process and the role of a composer/sound designer

- Learn how to collaborate with game developers effectively
- Apply music and sound implementation techniques to a real game project

### Deliverables:

- Game project featuring custom music and sound effects

## Week 8: Final Project and Presentation

### Activities:

- Finalizing the game project
- Preparing a presentation on the game project's music and sound design
- Presenting the game project to the class

### Learning Outcomes:

- Demonstrate mastery of video game music composition, procedural music, and meta sounds
- Develop presentation skills
- Reflect on the learning experience and personal growth

### Deliverables:

- Completed game project
- Presentation on the game project's music and sound design

# Collaboration With Game Developers

## Week 9

### Activities

- Lecture on git, and various project management techniques and skills.
- Practice pushing and pulling code from the same repository
- Introduction to an Unbounded R&D open source project
- Setup the project on local machine
- Push code to project

### Learning Outcomes

- Understanding Git and Project Management Techniques

- Exposure to Unbounded R&D Open Source Project
- Project Setup and Configuration
- Contributing to Open Source Projects

### Deliverables

- Unbounded R&D open source project is setup and running on local machine
- Code is pushed to repository

## Week 10-13

### Activities

- Brainstorming on what we can add as a team to the open source project
- Developing tasks that can be divided amongst team members
- Implementing tasks

### Learning Outcomes

- Collaborative Brainstorming
- Task Development and Distribution
- Task Implementation

### Deliverables

- Tasks are implemented
- Kanban taskboard

# Research and Development

## Week 14

### Activities

- Identify potential research topics
- Discuss project planning, milestones, and deliverables
- Assigning roles within the group
- Identifying available resources (software, hardware, etc.)

### Learning Outcomes

- Research Topic Identification

- Project Planning and Management
- Role Assignment and Teamwork
- Resource Identification and Utilization

### Deliverables

- A research topic chosen by each group
- Preliminary project plan

## Week 15 - Week 20

### Activities

- Catalog research and development of chosen projects
- Discuss progress and challenges in weekly meetings with mentors
- Reflect on feedback from mentors after regular checkpoints
- Align research with goals and objectives
- Draft research paper: Introduction, background, methodology, results, and conclusion

### Learning Outcomes

- Document research and development
- Discussion progress and challenges
- Align research with predefined goals and objectives
- Draft a research paper

### Deliverables

- Weekly progress updates
- Iterative improvements to a working prototype of the project
- Draft version of research paper

## Week 21

### Activities

- Integrate feedback from mentors
- Verify and finalize references of the research paper
- Lecture on the process of publishing research papers
- Prepare presentation

### Learning Outcomes

- Integrate feedback in a research paper

- Verify sources
- Create presentation based on paper

### Deliverables

- Completed research project
- Submission-ready research paper
- Draft of presentation

## Week 22

### Activities

- Submitting the research paper to conferences and/or journals
- Preparing a project presentation
- Celebrating the achievements and hard work of the participating students
- Present research

### Learning Outcomes

- none

### Deliverables

- A submitted research paper
- A final presentation showcasing the project