CSC 193 STEM Incubator in Computer Sound and Music
Professor Burg
Spring 2014

Meetings: Tuesdays, 4:00-5:00 PM

CSC 193 Computer Sound and Music

Mentor/Apprentice Approach in the Course: The class will have students at two levels: mentors and apprentices. The mentors will help the apprentices to understand basic audio/MIDI applications and musical/mathematical concepts. All students will contribute their ideas and efforts toward a collaborative musical production or real-time music production system.

Course Content: In this section, students will be exposed to software that allows the user to interact with a computer to generate sound and music. They will learn two ways to create and edit music with computer-based application programs: first, by means of sample-based digital audio, and second by means of MIDI (musical instrument digital interface) sequencers, samplers, and synthesizers. As a collaborative effort, students will design their own project, with mentor students directing apprentices. Students will learn how to use software for combining digital sound and MIDI into a creative musical production, with mentors adding their own creative twist by means of programming in C++ or Java. No background knowledge or prior experience are required for apprentice students.

Course Emphases: logical, algorithmic, and mathematical problem-solving in the realm of digital sound and music; interdisciplinary thinking and creativity

Demonstrable Outcomes: At the end of the course, students will be able to:

- Identify software for recording, editing, and manipulating digital sound and MIDI files (e.g., Audacity, Audition, Sonar, Reason, Finale, Max/MSP).
- Explain the difference between sample-based digital audio and MIDI and be able to choose the appropriate platform for a given musical purpose.
- Explain the difference between MIDI samplers and synthesizers and know the basics of how to use both for recording and editing.
- Explain how frequencies relate to pitches and musical notes, scales, intervals, and chords in the music of the Western world.
- Mentors will be able to operate on sound files at the programming level (e.g. C++, Java, or MATLAB), integrating the resulting sound files with a musical production created in Sonar.

Mentor’s role: The mentors must already have taken at least one computer programming course. The mentors’ role is to help the apprentices learn how to use high-level sound/MIDI editing software, help them to understand the mathematics of sound and music, and introduce them to ways that music can be produced and edited digitally. Mentors will have the additional challenge of working at a lower level of abstraction, manipulating sound and MIDI with C++, Java, MATLAB, or Max/MSP programs.
**Apprentice’s role:** With the help of the mentors, apprentices will:

- Learn about MIDI and how it is used as a symbolic message system for creating sound and music.
- Learn about sampled digital audio.
- Learn how to use software like Apple Logic and Audacity for music creation.
- Learn basic concepts related to music of the Western world, including
  - *pitches, notes, and scales*
  - *melody and harmony*
  - *intervals and chords*
  - *tempo*

**Basis of Grade:**

- Weekly demonstrations and discussion of the progress of the project (with the instructor and fellow students in this STEM section)
- Possibly, short oral or written tests on basic concepts.
- Periodic short oral presentations in front of the entire STEM Incubator group (all sections).
- Demonstration of the final musical production at the end of the semester.