MUS 471L Syllabus

Semester:	Spring 2021
Course title:	Audio Design Project IV Lab
Instructor:	Matt Klassen
Time/Place:	labs: T,Th 4:00 - 5:20 online

COURSE DESCRIPTION:

This course continues to present a guided lab environment to pursue project work in audio design and implementation. Particular topics and project work include: parametrized audio components with user interfaces, audio-plugin development, and audio algorithm implementation.

PREREQUISITES and COREQUISITES:

Prerequisites: MUS 470, MUS 470L

Corequisites: MUS 471

COURSE GOALS AND OBJECTIVES:

1) Students learn the basic definitions and low-level algorithms in audio physical modeling

2) Students will become familiar with mid-level components and plugins

3) Students gain experience with user interface design for audio applications

4) Students will implement an application related to audio engine design, physical modeling, or digital signal processing

DISABILITY SUPPORT SERVICES:

If students have disabilities and will need formal accommodations in order to fully participate or effectively demonstrate learning in this class, they should contact the Disability Support Services Office at (425) 629-5015 or dss@digipen.edu. The DSS office welcomes the opportunity to meet with students to discuss how the accommodations will be implemented. Also, if students need assistance in the event of an evacuation, they should let the instructor know.

GRADING:

Attendance	20%
Assignments	20%
Milestones and Reports	20%
Final Project	40%

Grades will be determined based on total course percentage. Percentage scores will determine letter grades according to the scale: (in the worst case)

A	$93 - 100$
A-	$90 - 92.9$
B+	$87 - 89.9$
B	$83 - 86.9$
B-	$80 - 82.9$
C+	$77 - 79.9$
C	$73 - 76.9$
C-	$70 - 72.9$
D	$60 - 69.9$
F	< 60

ASSESSMENT and RUBRICS:

Programming assignments may be given to emphasize certain aspects related to the project work, especially where students show the need for improving certain skill sets which are relevant. Two project milestones, as well as two pre-milestone reports, must be met on time and be complete in order to receive full credit. Partial credit may be given for aspects which are complete and can run, or stand alone, correctly and independently of missing or not yet functional portions. In some cases partial credit may be given for partially complete work on a given aspect of the milestone requirements, but only if significant and clear progress is displayed.

ACADEMIC INTEGRITY:

Academic dishonesty, or cheating, occurs when a student represents someone else's work as their own, or assists another student in doing so. This can happen on exams, quizzes, homework, or projects. Academic dishonesty also may occur when a student uses any prohibited reference or equipment in the completion of a task. For example, the use of a calculator, notes, books or the internet when it is prohibited. Plagiarism is a common form of academic dishonesty. This can take the form of copying and pasting exerpts from the web, and representing them as original work. The type and severity of any occurence, as well as the legitimacy of any claim of academic dishonesty, will be judged by the instructor and the disciplinary committee. All students are asked to help in promoting a culture of academic integrity by discouraging cheating in all forms.

TENTATIVE WEEKLY TOPICS:

The following represents a proof of concept listing of topics with a chosen emphasis on physical modeling of sound. The emphasis, or central topic, may vary each semester that the course is taught.

Week	Dates	Topics
1	Jan 6 - 10	Introduction to sound modeling Assignment 1: Modfiy the basic instrument audio plugin
2	Jan 13 - 17	Acoustic modeling with delay: digital waveguides, delay lines, comb and allpass filters Assignment 2: Spectrum shaping of the plucked string filter
3	Jan 20 - 24	Feedback delay networks (FDN) for reverb simulation Assignment 3: Basic FDN implementation
4	Jan 27 - Jan 31	Interpolation of signals: from sample-rate conversion to windowed sinc interpolation Assignment 4: Up sample-rate conversion with polynomial interpolation
5	Feb 3 - 7	User Interfaces for musical instrument modeling Assignment 5: Pitch shifting exercise
6	Feb 10 - 14	Mass-spring systems, finite differences and numerical modeling Assignment 6: Numerical integration and function approximation
7	Feb 17 - 21	Modeling of transfer functions, resonators, and phasing Assignment 7: Biquad filter implementations
8	Feb 24 - Feb 28	Audio plugins: models, design and implementation Assignment 8: Plucked string instrument audio plugin
	Mar 2 - 6	Modeling of brass and woodwind instruments, plucked and hammered strings Assignment 9: Flute modeling assignment
9	Mar 9 - 13	Finite differences and direct numerical simulation of models Assignment 10: Footsteps model
10	Mar 16 - 20	Spring Break
11	Mar 23 - 27	Nonlinear models for strings, plates, and tubes
12	Mar 30 - Apr 3	Frequency tracking analysis, vibrato modeling
13	Apr 6 - 10	Commuted synthesis, body-model factoring
14	Apr 13 - 17	Real-time timbre morphing, continuous timbre control space
15	Apr 20 - 24	Final Exams