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Music 420A: Signal Processing Models in Musical Acoustics

1 Course Overview

Music 420A (EE 367A) is about computational electroacoustic modeling for digital audio effects, sound synthesis, and signal processing for physical modeling in general.

Explore Courses Listing

1.1 When, Where, Who

Term: Winter Quarter, every other year (including 2016-2017)
Location: Main CCRMA Classroom (Knoll 217)
Time: Tuesdays and Thursdays, 3:30-4:45 PM,
Instructor: Julius Smith (jos@ccrma.stanford.edu)
TA: Irán Roman (iran@ccrma.stanford.edu)
TA Office Hours: Wednesdays 8-10pm
JOS Office Hours: by appointment after class and/or other times as arranged by email
Website: https://ccrma.stanford.edu/courses/420/

Explore Courses Listing

1.2 Prerequisites

The prerequisites for Music 420A consist of prior first courses in signal processing and elementary dynamics, together with programming in C++ and matlab. Familiarity with UNIX-style programming tools (make, bash, etc.) is desirable.

Example Prerequisite Courses

At CCRMA, Music 320A&B and Music 256A generally provide adequate preparation in conjunction with a physics background up to and including dynamics (all about “f = ma”):

• Music 320A\[3] or equivalent (prior exposure to complex numbers, sinusoids, elementary linear systems theory, digital filters, Laplace and z transform analysis);

• Music 256A\[4] or equivalent (prior experience with C++ programming for real-time audio applications);

• Physics 21 (mechanics), or equivalent experience with Newton’s law of motion, “f = ma”.

Having taken Music 256A will support more advanced independent project work.

1 https://exploreourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=&academicYear=&q=music+420a&collapse=
2 https://exploreourses.stanford.edu/search?q=music+420a&view=timeschedule&academicYear=&catalog=&page=0&filter-coursestatus-
3 https://ccrma.stanford.edu/courses/320/
4 https://ccrma.stanford.edu/courses/256A/
Prerequisite Software

C++ and Matlab\footnote{http://www.mathworks.com/} (or Octave\footnote{http://www.octave.org/}) are required for many of the exercises and starter software.

1.3 Required Software

Lab exercises in this course require basic C++ programming, on the level of the Synthesis Tool Kit\footnote{https://ccrma.stanford.edu/software/stk/} (STK). Also, for sound analysis and display, proficiency with (and access to) Matlab or Octave is assumed.

1.4 Important Pointers

The course schedule and outline\footnote{https://ccrma.stanford.edu/~jos/intro420/Schedule_Assignments.html} in \ref{sec:schedule} on page \pageref{sec:schedule} (also reachable from the class home page\footnote{https://ccrma.stanford.edu/courses/420/}) lists all topics covered, lecture overheads, reading assignments, lecture videos, and hw/lab assignments.

1.5 Textbook

The text for this course is Physical Audio Signal Processing\footnote{https://ccrma.stanford.edu/~jos/pasp/} by JOS:

- Available for free online in HTML format.
- Printed hardcopies\footnote{https://ccrma.stanford.edu/~jos/pasp/pasp-hardcopy.html} also available.
- Reading assignments will be specified in the course schedule and outline.

1.6 Prerequisite-Level Reading

This course assumes the student is familiar with elementary signal processing on the level of the following textbooks:

- Mathematics of the Discrete-Time Fourier Transform (DFT)\footnote{https://ccrma.stanford.edu/~jos/mdft/} — prerequisite material pertaining to the DFT (Music 320 text)
- Introduction to Digital Filters\footnote{https://ccrma.stanford.edu/~jos/filters/} — prerequisite material in the area of digital filtering and linear systems theory (Music 320 text)

2 Schedule

Below is our current schedule, with pointers to all reading assignments, lecture overheads, and theory/lab exercises for the course.

[TBA]