ECES 497 – Digital Signal Processing for Audio

# Course Description

This course will focus on the foundations of Digital Signal Processing (DSP) and how DSP can be applied to audio processing and manipulation. The course will cover mechanisms including, but not limited to, Discrete-Fourier Transforms, Fast-Fourier Transforms, Spectrogram Analysis, Sampling, Aliasing, *Quantization*, and Timbre. Once basic knowledge of these have been achieved, the course will turn its focus to creating a project which will implement and apply some of these techniques to audio processing in a highly efficient manner.

# Grading

The grade in this course will be based on the concepts learned and a project-based evaluation. A good project will satisfy application of learned techniques as well as a well-designed and implemented system which uses them.

Sinusoidal model of monophonic instrument

# Schedule

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| **Week** | **Topic** | **Deliverables** |
| 1 | Create syllabus, gain basic understanding of course concepts | - Syllabus and week-by-week schedule |
| 2 | Reading Audio Signals, Sampling | - Read audio signal as data, print live data readout.  - Allow user to select sample range and return average data |
| 3 | Aliasing, Discrete Fourier Transforms | - Produce outputs with/without anti-aliasing filters |
| 4 | Fast Fourier Transforms, Spectrogram | - Produce real-time visualization of Frequency Domain of an audio sample  - Produce a spectrogram based on various parameters |
| 5 | Project formation and design | - Project description and specification |
| 6 | Project work | Progress report |
| 7 | Project work | Progress report |
| 8 | Project work | Progress report |
| 9 | Project work | Progress report |
| 10 | Project finalization | Project evaluation write-up |
| 11 | Project presenation | Project presentation |

# Resources

Audio Signal Processing in Matlab webinar - <http://www.mathworks.com/videos/audio-signal-processing-in-matlab-86358.html?form_seq=conf1260&elqsid=1421177507698>