Engin 100 Section 300   MUSIC SIGNAL PROCESSING   Fall 2008

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The goals of this course are: (1) To analyze music the way an
engineer would analyze an unfamiliar phenomenon; (2) to learn
the basics of Fourier signal analysis and synthesis, motivated
by observation of musical signals; (3) to apply this to design
of two projects; (4) to introduce students to oral and written
technical communication, working in teams, and problem solving.

Absolutely no previous knowledge of music is necessary at all.
Teams should include a member with some basic knowledge of music
and another member with some very basic programming experience.
This is NOT a composition or performance arts technology course.
No calculus or complex numbers will be required in the course.

Several weekly labs will allow students to compute frequencies
of musical notes using signal processing techniques, discover
relations between them using semilog plots, learn and then apply
basic Fourier signal analysis techniques (including time-frequency
analysis) to simple music, and simple digital synthesis of music.

There are two projects: (1) analysis of touch-tone phone signals
and design of touch-tone analyzers and synthesizers on a computer;
and (2) a simple music synthesizer and music transcriber that
produces a musical-staff-like transcription from .wav files of
synthesized music, also on a computer. Both of these projects will
requires students to apply learned signal processing techniques
to analyze, design and test a solution to an open-ended problem.

In the course of these projects, students will learn to function
in teams, apply engineering techniques to analysis and design, and
write and present technical reports demonstrating and documenting
their results. Music transcription is not yet completely solved, so
there is a definite open-ended nature to this part of the project.
Ethical issues include whether music, regarded as a string of numbers
or as a mathematical function, should be copyrightable, and whether
a new synthetic instrument should be patentable.

This course will be of interest to students interested in electrical
engineering, signal processing, and music technology.