Lecture demos for 371

Fall, 2019

Sept. 5: Introduction, fundamentals

Scope, tuning fork, longitudinal wave spring demo

Sept. 10: Oscillations, simple harmonic motion

Scope, recorder, violin, coronet, tuning fork

Hookes Law demo

Two springs with different spring constants

Steel ball on track

Sept. 12: Simple harmonic motion, standing waves

Hookes Law demo

Two horizontal strings of different thicknesses strung across room with weights to adjust tension and folded cards to bounce off

String with weighted anchor to vary tension

Longitudinal wave demo with slinky

Sept. 17: Sound waves and propagation

Longitudinal wave demo

Coronet in freezer (mouth piece not)

Helium and sulfur hexafluoride gases

Organ pipe and liquid nitrogen

Sept. 19: Superposition and interference

Plastic sheets with circle patterns for interference visualization

Beat wave visualization on scope using tuning forks

Beat wave visualization on scope using signal generators

Projection for transparencies

Diffraction demo: ripple tank with camera for imaging

Sept. 24: Standing Waves on Strings

Standing wave demo with adjustable drive and strobe

Monochord with mic

Vibrating metal plate and sand grains

Sept. 26: Standing waves, harmonic spectrum

Standing wave demo with adjustable drive and strobe

Monochord with mic

Oct. 1: Waves in pipes

Standing wave pipe with sliding mic, scope and variable frequency drive

Organ pipe demos (closable pipe)

Oct. 3: Waves in pipes, resonance, and impedance

Standing wave tube with tunable drive, mic and scope

Two tuning forks for demonstrating resonance

Driven damped pendulum lab experiment from 107 lab

Instruments: violin, cornet, xylophone, monochord, drum

Tuning forks and resonant box

Oct. 8: Fourier analysis

Fourier synthesizer with scope to show synthesized wave forms

Real time Fourier analysis

Instruments: violin, cornet, recorder, flute

Oct. 10: Ear, hearing

Ear visuals

Phillips Sound Demos

Response of the ear – Loudness and frequency

Oct. 15: Sound intensity, loudness

Phillips Sound Demos

Loudness

Pitch differentiation

Oct. 17: Critical bands, masking

Phillips Sound Demos

Critical Bands

Masking

Oct. 22: Frequency, pitch perception

Phillips Sound Demos

Circularity of pitch

Stretched octave

Oct. 24: Exam

Exam I

Oct. 29: Physics of intervals

Monochords

Oct. 31: Just scale, temperaments

Clavichord to demonstrate meantone temperament

Nov. 5: Wind instruments: sound excitation

Bernoulli demos, including

Bernoulli ball

U tube with flow

Aspirator

Flow visualization graphics

Turbulence visuals

Nov. 7: Woodwinds

Organ pipe edge tone demo with real time Fourier analysis

Clarinet

Oboe

Flute

Nov. 12: Room acoustics

Nov. 14: Harpsichord, piano

Harpsichord Jack

Inexpensive keyboard and real time Fourier analysis

Piano wire

Steinway Piano Demo

Nov. 19: Voice

Real time Fourier analysis

Nov. 21: Strings: bowed

Violin

Violin parts

Piano Wire

Monochord with bow, pick up and scope to visualize sawtooth like wave pattern

Violin shaped vibrating plate with tunable power supply and camera so students can see sand patterns

Tuning fork with resonant box

Slip stick animations

Nov. 26: Reeds

Reed organ pipe

Clarinet mouthpiece

Harmonica reeds

Dec. 3: Brass

Cornet

Dec. 5: Percussion

Tampani

Vibrating plate with sand

Dec. 10: Exam

Exam II

Lecture 23: