

PHY 140

PHYSICS of SOUND – Spring 2013

Instructor: Professor Dmitry Garanin

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Office hours: Tu & Th 3:00 pm – 4:00 pm

Course schedule: Lectures Tu & Th 12:30 pm – 1:45 pm

Labs Tu 2:00 pm – 3:40 pm

Detailed description of this course is available online at:

<http://www.lehman.edu/faculty/dgaranin/>

Main textbook: *The Physics of Sound*, by R. Berg and D. Stork (3rd edition) Price: \$100.

Other useful books:

1) *Fundamentals of Sound with Applications to Speech and Hearing*, by W. Mullin et al,
<http://www.ablongman.com/mullin>

2) *The Physics of everyday phenomena*, by W. T. Griffith, http://highered.mcgraw-hill.com/sites/0072509775/information_center_view0/

This course is a single-semester introduction to the physics of sound. It contains a lecture/demonstration/discussion session (two classes, 3 hours weekly) and a laboratory session (1 lab, 2 hours weekly). Class participation is an essential component of the course, attendance will be checked.

In particular, the attendance at the weekly lab and turning in a satisfactory lab report on time is required for a grade in the course. Lab reports are due at the beginning of the next lab session. Students missing more than two labs will not receive a passing grade for the course. If you missed a lab, try to make up for it during the same week, before the lab setup has been dismantled.

Course Outcomes/Objectives: Solid qualitative understanding of physical phenomena in the sound production, propagation, and perception. Mastering scientific terminology of the physics of sound. Building a scientific foundation for more specialized courses such as speech & hearing and music theory

Class topics: Introduction. Oscillations; Waves and Sound; Standing Waves and Overtone Series; Analysis and Synthesis of Complex Waves; Resonances in Sound Production; Speech and singing; Hearing; Room and auditorium acoustics; Sound recording and reproduction; Digital recording; Music temperament (Detailed course program: <http://www.lehman.edu/faculty/dgaranin/> -> Teaching -> Physics of Sound)

Exams and grading:

There will be three midterm exams and a final. The final exam will be cumulative. There will be no makeup exams, except for documented emergency. You will be earning points for the following:

Midterm exams: 15 + 15 + 15 = 45 (max)

Final exam: 30 (max)

Labs: 25 (max)

Total: 100 (max).

There will be no dropping lowest grades and “curving”. At the end the points will be converted into grades A, B, C, etc. according to the zone principle (say, A is 100-80 points, etc.). The zones are not fixed but will be chosen appropriately at the end of the semester.

Objectives of the course: Understanding of basic physical principles of propagation of waves in the media, knowledge of different types of waves and wave processes. Understanding of resonances in sound production, role of overtones and formants in formation of sound in speech and music. Understanding of the anatomy of the speech apparatus and the ears and the physical principles behind. Room and auditorium acoustics, sound recording and reproduction, digital recording. Music temperaments.

Schedule of exams:

Midterm exam 1: Tuesday, March 5

Midterm exam 2: Thursday, April 4

Midterm exam 3: Thursday, April 25