



Syllabus (two pages)

PHYS 141 – Musical Acoustics – Spring 2013

Class: 2:00 – 3:15 pm, TR, Music Building 209

Lab: 3:30 – 5:20 pm, T, Science building 146

Instructor:

Dr. Carlos A. Bertulani

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Textbook:

Class notes by Carlos Bertulani

Course Content:

Four semester hours. Intro to Musical Acoustic - Four semester hours (2 lecture1, 1 lab/week). The course covers basic physical principles of waves required to understand the phenomenon of music, the characteristics of musical instruments and sound effects of rooms/halls for music majors and any one interested in the sciences behind the music, in musician-friendly format. Basic concepts such as frequency, harmonics, and pitch, physics-based questions on such topics as music acoustics, stringed instruments, wind instruments, singing and electronic instruments will be discussed in lectures. Hands on labs and homework exercises will supplement the lectures.

Goals and Learning Outcomes for this Course

Goal 1: Students will understand the discipline-specific knowledge in musical acoustics, covering the subjects:

1. *Basic mathematics*
2. *Physics quantities*
3. *Simple vibrating systems*
4. *Harmonics in strings, pipes and drums*
5. *The human ear*
6. *Tone quality*
7. *Frequency and pitch*
8. *Intervals, scales, tunings and temperament*

Objective 1: Students will know the concepts of musical acoustics and demonstrate a proficiency in the fundamental concepts in this area of music.

Objective 2: Students will be able to explain concepts of musical acoustics and to show a working knowledge of a broad array of musical phenomena that are based upon fundamental concepts of physics.

Goal 2: Students will have strong physical reasoning and problem solving skills and apply these skills to the understanding of practical problems in music.

Objective 1: Students will be able to understand music using their knowledge and skills in physics. They will use critical thinking skills to understand sound, waves, and complexity in music using basic physics knowledge.

Objective 2: This course will offer a curriculum emphasizing physical science to produce professionals capable of applying broad theoretical insight to understanding the principles of sound and music.

Assessment

The following measures will be used to assess the success of this course in achieving the above objectives:

Student Work: exams, homework presented in classroom.

- The course will have 2 midterm tests, plus a comprehensive final covering all course material. Laboratory reports will be an important part of the final grade.
- The total grade will consist of theoretical exams (65% total), and quality of the laboratory reports (35%).

A typical exam question is shown below. Expect 5 of similar questions in each midterm exam, and 8 in the final exam.

“Someone is trying to tune a guitar. One of the strings is supposed to have a frequency of 500 Hz. The person is using a tuning fork which produces a sound of exactly this frequency, but while sounding the fork and the playing the guitar, hears a beat in the sound with a frequency of 3 Hz (3 beat per second). a) What is the real frequency of the guitar string? b) By what fraction does the person need to change the tension of the guitar string to tune it properly?”

Student Perception Survey: to determine whether students believe that they have achieved the objectives of the music major.

- This survey will be developed in the Spring of 2013, and administered to students at the end of the semester.
- The physics and astronomy department utilizes an online questionnaire provided via the MyLeo TamuC system with statements regarding various elements of instruction. These comments are given to the instructor and department head soon after the grades are

recorded. If students have concerns about the classroom experience during the semester they should inform the instructor of those concerns and failing a satisfactory response may, as a last resort, contact the physics and astronomy department head with those concerns.

Attendance and Tardiness: Students are expected to be on time and present for all class meetings. Excused absences can be arranged prior to the class period being missed for appropriate activities as determined by the instructor. If an emergency results in an absence, the student should contact the instructor as soon as possible informing the instructor of the emergency and inquiring about ways to make up the missed class. The instructor will make judgments on how to handle the situation. Possible reasons for an excused absence are listed in the "Student's Guidebook" under class attendance policy. Attendance and tardy records will be maintained and both may result in deductions from your overall grade.

Classroom Behavior: Disorderly conduct which interferes with the normal classroom atmosphere will not be tolerated. The classroom instructor is the judge of such behavior and may instruct a disorderly student to leave the room with an unexcused absence or in more serious situations a student may be removed from the class with a failing grade.

Cheating and other Breaches of Academic Conduct: Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University as described in the "Code of Student Conduct" section of the "Student's Guidebook".

ADA Eligible Students: ADA eligible students should make arrangements with the instructor in the first week of the semester about special arrangements needed for classroom or testing facilities and procedures to accommodate the disability.