Physics 105 – Basic Acoustics of Music – Summer Term I 2008
Lecture 8:30-10:40 AM MTWThF in Halsey 310
Lab 10:45 AM-12:45 PM MTWTh in Halsey 360

Instructor: Dr. Dennis Rioux
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Office Hours: MTWThF 11:20-12:30 **Schedule:** http://www.phys.uwosh.edu/rioux

Content: This course is an introduction to the acoustics of music using algebra and trigonometry. Basic physical concepts associated with motion, force, and energy are applied to ideal vibrating systems, resonant systems, string waves, and sound waves. Real world uses and consequences of these concepts are explored in different instrument classes, signal processing, room acoustics, the human sense of hearing, etc.

Liberal Arts: An introductory course in the acoustics of music cannot help but fulfill the interdisciplinary spirit of the liberal arts. In a university setting we tend to think of distinct fields of study and departments of this or centers for that just because of the way the place is organized. But working in the spaces between different academic areas often reveals a rich set of phenomena, and the study of sound is an excellent example of this involving physics, music, physiology, psychology, engineering, and electronics to name a few. We will begin our study of acoustics with some fundamental physics concepts that will probably be new to you, but one of the goals of this class is to then illustrate and explore connections to other disciplines, particularly music. There are many places we can "go" in this class, and as liberal arts students I hope we all follow where our curiosity leads and demand that it be satisfied.

Texts: *The Science of Sound* – Thomas D. Rossing, F. Richard Moore, Paul A. Wheeler
Acoustics Laboratory Manual – Dennis Rioux

Web Page: http://www.phys.uwosh.edu/rioux/acoustics

Grading: Your grade in this course will be based on the exams, homework assignments and in-class work that you have completed by the end of the semester, July 6, 2007. The use of a fixed scale is done to encourage cooperative learning rather than competition for grades.

Components:		**Grade Scale:**			
Exams	75%	90-100%	**A**	70-75%	**C**
Homework	15%	85-90%	**AB**	65-70%	**CD**
Lab	10%	80-85%	**B**	60-65%	**D**
		75-80%	**BC**	0-60%	**F**

Homework: When learning physics it is important that you continually use your newfound knowledge. As part of your physics regimen, homework sets will be assigned twice a week and are due at the end of lab on Wednesdays and Mondays. I strongly encourage you to work together on the problem sets to discuss physical concepts and problem solving techniques. Beware of merely copying someone else's solutions as this will only hinder your learning progress and exam performance. After a homework set is due, I will post solutions on the web page. Late homework will not be accepted.

Laboratory: The laboratory sections will give you an opportunity to perform experiments designed to illuminate particular physical concepts. If you must miss a lab it is your responsibility to complete the lab by the end of the day following the regularly scheduled lab period because the equipment is changed and the previous experiment will no longer be available. There should be enough time within the scheduled lab period to complete the entire lab write-up. I encourage you to finish your analysis before leaving because measurement errors can be corrected immediately without a special trip back to the lab.

Exams: Four sectional exams will be given during class time on the dates indicated in the syllabus. The exams will be closed-book and closed-note. You may use a calculator during the exam, and I will supply you with a "formula card" for each exam. Exams will consist of both short-answer qualitative questions and computational quantitative questions. Be sure to show all of your work and document it even if you did it "in your head" or "on your calculator."

Tentative Syllabus

Day	Topics	Lab	Text
June 16	Introduction, Motion	#1 Velocity	Chapter 1
June 17	Force, Energy	#2 Acceleration	Chapter 1
June 18	Oscillations	#3 Force	Chapter 2
June 19	Waves	#4 Oscillators	Chapter 3
June 20	Waves – **Exam #1**		
June 23	Resonance	#5 Phase & Modes	Chapters 3 & 4
June 24	Resonance	#6 Standing Waves	Chapter 4
June 25	Hearing,	#7 Resonance	Chapters 5 & 6
June 26	Sound Pressure, Loudness	#8 Chladni Plates	Chapter 6
June 27	Loudness – **Exam #2**		
June 30	Pitch, Fourier Analysis	#9 Loudness Scaling	Chapter 7
July 1	Combination Tones	#10 Fourier Analysis	Chapter 8
July 2	Superposition	#11 Lissajous Figures	Chapter 8
July 3	Musical Scales – **Exam #3**		Chapter 9
July 7	Reflection	#12 Absorption	Chapters 9 & 23
July 8	Diffraction, Auditoriums	#13 Filter Circuits	Chapter 19 & 20
July 9	Circuits, Speakers	#14 Speaker Design	Chapter 23
July 10	Sound Fields & Reinforcement		
July 11	**Exam #4**		