Fall Term, 2014

Syllabus: PHY3100, "The Sounds of Music"

Instructor: Paul E. Karchin, Professor
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Office Hours. Students are welcome to meet with me after class or at another arranged time. I am happy to correspond by e-mail.

Class Meetings:

type	day(s)	time	room	course ref. no.	section
Lecture	T & Th	11:45-1:10	410 STA	13513	001
Lab	M	11:45-1:45	115 PHY	13514	002
	W	11:45-1:45	115 PHY	13516	003
	T	9:35-11:35	115 PHY	13517	005

Course Description: Prereq: sophomore standing. Meets General Education Laboratory Requirement. For music majors and other students interested in the physical foundations of the production, perception, and reproduction of musical sounds. Makes only limited use of simple mathematics. Includes topics such as wave properties, loudness levels and the human ear, hearing loss, tone quality, frequency and pitch, musical intervals and tuning, room acoustics, the production of sound by various musical instruments, and electronic reproduction of music. This is a 4-credit course.

Student Learning Outcomes. Identify and describe: the physical phenomenon of sound, physical systems that produce sound, production and character of sound from musical instruments and the human voice, the construction and operational features of the human ear.

Required Text: *The Physics of Sound,* third edition by Richard E. Berg and David G. Stork, Pearson, (2005); ISBN 0-13-145789-6. This book can be purchased used for about $70 or rented for about $40 from reputable internet sellers such as amazon.com and barnesandnoble.com. At the WSU Barnes and Noble bookstore the textbook price is about $124 used and $75 for rental. The course will follow the text, and appropriate sections for reading are included in the detailed class schedule.

Exams. There will be three exams, of equal weight in grading, each covering about a third of the course material. Exams are closed book.

Homework Problems are assigned along with each lecture. The problems won't be collected or graded, but they will help you prepare for the exams.

Attendance and Class Participation. Students are expected to attend regularly and participate in class activities which include student learning communities – groups of 3-4 students who work together inside and outside of class.

Laboratory. There are 10 labs. To get credit for a lab, attendance is required and a written report is due at the end of the lab session, or with permission of the instructor, within a week after the lab session. The lab manual will be made available on a course website. Students are responsible to print out their own copy of each lab and bring it to the lab session.

Grading. The course grade has the following components:
60% -exams, after dropping the lowest-score (or missed) exam
15% - lecture class attendance & activities, after dropping up to three missed classes.
25% - lab reports, after dropping the lowest-score (or missed) lab

The course grade will be assigned according to the total number of percentage points as follows.

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
90-100	85-89	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	0-39

Policy on Missed Work. There are no make-up exams or labs. The grading scheme, dropping the lowest-score (or missed) exam and lab, and dropping credit for up to three missed lecture class activities, will accommodate routine illness and personal contingencies.

Generally, if a student is registered for the course a regular grade will be given. A grade of incomplete (I) will be given only in exceptional cases (to accommodate illness or emergency) after consultation with Prof. Karchin before the end of the term.

Student Disability Services. If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Please discuss your registered accommodations with the instructor.

P3100 Class Schedule (Check for Revisions During the Term!)

Lec. Date	Topic	Sections	Lab (M, T, or W)
Aug. 28	Physical Units; Simple Harmonic Motion	1.1-1.2	No lab
Sep. 2 Sep. 4	Damped, Driven, and Combined Oscillations Transverse and Longitudinal Waves, Huygen's Principle, Superposition, Inverse Square Law, Polarization	1.3-1.4 2.1-2.2	No lab
Sep. 9 Sep. 11	Reflection, Refraction Interference, Diffraction	2.3 2.3	Simple Vibrating System
Sep. 16 Sep. 18	Addition of Waves, Beats Standing Waves, Harmonic Series	2.4-2.5 3.1-3.2	The Oscilloscope
Sep. 23 Sep. 25	Review no lecture		Properties of Waves
Sep. 30 Oct. 2	**Exam 1** Mersenne's Laws, Tube Waves	**1.1-3.2** 3.3-3.4	No lab
Oct. 7 Oct. 9	Fourier Synthesis Fourier Analysis	4.1 4.2	Beats, Tuning, and Pitch
Oct. 14 Oct. 16	Resonance Hearing Physiology, Place Theory	4.4 6.1-6.2	Standing Waves on Strings
Oct. 21 Oct. 23	Hearing & Intensity Hearing Perception	6.3-6.4 6.5-6.8	Standing Waves in Air
Oct. 28 Oct. 30	Binaural Hearing & Hearing Loss Voice Physiology, Review	6.9-6.11 6.12-6.14	Sound Levels
Nov. 4 Nov. 6	**Exam 2** Room Acoustics	**3.3-6.14** 8.1-8.3	No lab
Nov. 11 Nov. 13	Musical Temperament Recorder and Flute	Appendix A, 9.1-9.3, 9.7 10.1-10.4	Ear Sensitivity
Nov. 18 Nov. 20	Clarinet, Saxophone, Oboe, Organ Trumpet, Trombone, and Horn	10.5-10.7, 10.9 11.1-11.5	Musical Instruments
Nov. 25 Nov. 27	Violin, Harp, Guitar (Thanksgiving Break)	12.1-12.4	No lab
Dec. 2 Dec. 4	The Piano Bar Percussion, Tympani	13.1-13.3 14.1, 14.3	Musical Intervals
Dec. 9 Dec. 12 **(F)**	(Study Day) **Exam 3** (10:40-1:10)	 **8.1-14.3**	