August 30, 2012

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	245 PHY	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.

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 over the internet. I recommend reputable websites such as amazon.com and barnesandnoble.com. 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.

Reading Quizes, Attendance, and Class Participation. A reading quiz will be given in each lecture class, based on the reading assigned for that lecture. Students are expected to attend regularly and participate in class discussion.

Laboratory. There are 10 labs. To get credit for a lab, attendance is required and a written report is due at the start of the next scheduled lab.

Grading. The course grade has the following components:
65% -exams, after dropping the lowest-score (or missed) exam
10% - lecture class attendance & reading quizzes, 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 up to three reading quizzes, 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 (subject to change)

Date	Topic	Sections	Questions/Problems	Lab (M,T,W)
Aug. 30	Introduction; Simple Harmonic Motion	1.1-1.3	Q 1.1, 1.4, 1.5, P1.2	no lab
Sep. 4	Damped, Driven, and Combined Oscillations	1.4-1.5	Q 1.6, 1.7, 1.10, P1.6	no lab
Sep. 6	Wave Basics	2.1-2.2	Q 2.1, 2.3, 2.4, 2.5, P2.5	
Sep. 11	Wave Behavior	2.3-2.5	Q 2.7, 2.9, 2.12, 2.15	Simple Vibrating System
Sep. 13	Extreme Waves	2.6-2.9	Q 2.17, P 2.8	
Sep. 18	Standing Waves and Resonance	3.1-3.2	Q 3.2, 3.5	The Oscilloscope
Sep. 20	String and Tube Waves	3.3-3.5	Q 3.3, 3.4, 3.6, 3.10, P 3.1, 3.2, 3.4, 3.6	
Sep. 25	Complex Waves;	4.1-4.2	Q 4.1, 4.2, P 4.1, 4.2, 4.5	Properties of Waves
Sep. 27	Tone Quality	4.3-4.4	Q 4.3, 4.4, 4.5, 4.7, 4.9, P 4.7	
Oct. 2	Exam 1	1.1-4.4		no lab
Oct. 4	Synthesis of Musical Sounds	5.1-5.2	Q 5.2, 5.2, 5.3, 5.4	
Oct. 9	Electronic Music	5.3-5.4		Beats, Tuning, and Pitch
Oct. 11	Human Hearing 1	6.1-6.4	Q 6.1, 6.2, 6.3, 6.5, P 6.1, 6.2, 6.3	
Oct. 16	Human Hearing 2	6.4-6.11	Q 6.7, 6.8, P 6.5	Standing Waves on Strings
Oct. 18	Human Voice	6.12-6.14	Q 6.10, 6.11, 6.18	
Oct. 23	Microphones	7.1-7.3	Q 7.1, 7.2, 7.3, 7.4, P 7.1	Standing Waves in Air
Oct. 25	Speakers and Amps	7.4-7.7	Q 7.8, 7.10	
Oct. 30	Sound Recording	7.8-7.10	P 7.2, 7.3, 7.4	Sound Levels
Nov. 1	Room Acoustics	8.1-8.5	Q 8.1, 8.2, 8.6, 8.10	
Nov. 6	Exam 2	5.1-8.5		
Nov. 8	Pitch 1	9.1-9.4	Q 9.1, 9.2	
Nov. 13	Pitch 2	9.5-9.8		Ear Sensitivity
Nov. 15	Woodwinds 1	10.1-10.5	Q 10.6, P 10.1, 10.3	
Nov. 20	Woodwinds 2	10.6-10.9	Q 10.11, 10.12, P 10.6, 10.7, 10.8	no lab
Nov. 22	(Thanksgiving Break)			
Nov. 27	Brass	11.1-11.6	Q 11.1, 11.5, 11.10, P 11.4, 11.6	Musical Instruments
Nov. 29	Stringed Instruments	12.1-12.4	Q 12.1, 12.2, P 12.1	
Dec. 4	The Piano	13.1-13.4	Q 13.1, 13.3, 13.8, P 13.1, 13.3, 13.4, 13.7	Musical Intervals
Dec. 6	Percussion Instruments	14.1-14.4	Q 14.1, 14.3, 14.4, P 14.1	
Dec. 11	Study Day			
Dec. 14 (Fri.)	Exam 3 (10:40-1:10)	9.1-14.4		

Instructions for Music Lab Reports

1. You will need to get your own copy of each lab exercise, either in print or saved on a laptop or other device. The lab exercises are written up as pdf files, and you will be able to download each experiment using BlackBoard. The files are readable with the free Adobe Acrobat Reader, or other pdf software. You should bring a copy with you to the lab session. To save time in lab, read over the instructions ahead of time to be familiar with what you will do.

2. Lab attendance is mandatory. You should be on time, not just for yourself, but for your lab partner(s). The music lab has six stations. The students in the lab will partner into groups of 2, or at most 3, for performing the lab exercises.

3. The lab exercises involve a series of observations and measurements. You will need to write down your measurements and observations to later put in your lab report. Each student must keep their own set of measurements and observations. This is known as *raw data*, and must be included with the lab reports.

4. The lab reports should be brief, but complete. The report should include

- Your name and the name of your lab partners.
- A brief description of what you did.
- The measurements you made and any results calculated from those measurements.
- Answers to the questions posed in the lab write-up.
- Observations you might have made. This can include a summary of what you learned in the course of doing the exercise and answering the questions.
- The original copy of the measurements made during the lab. This is to aid in understanding what you did, and to help you in case a mistake is found.

5. The lab reports are due at your next meeting of your lab session (or before). Late reports are not accepted. You can turn reports in at the Physics department office, where a date stamp is available.

6. Inexpensive calculators are generally useful during the laboratory sessions and when you are completing your laboratory write-up