COURSE INFORMATION: PHY 2464
Spring Semester 2005 (Section 5185X)

CLASSES - MWF, 4th Period (10:40 - 11:30 a.m.), Room 1216, New Physics Bldg.
INSTRUCTOR – Samuel Trickey (Professor, Physics and Chemistry)
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Phone 392-1597

OFFICE HOURS – Tues. 4th period (10:40 – 11:30 a.m.), Thurs. 2nd period (8:30 – 9:20 a.m.) or by appointment. Also I’ll handle short drop-ins if not otherwise occupied. Email queries are welcome (to preserve sanity I read email only one day each weekend, with no guarantee of which day!).


WEBPAGE - go to http://www.phys.ufl.edu/courses/ then click on PHY-2464. [FYI, my research web page is at http://www.qtp.ufl.edu/~trickey]

1. COURSE SUMMARY: For about one-third of the semester we will explore the physical principles and logic concerning sound. The basic topics are vibrations and the production of periodic waves, how our ears detect and process sound, sound transmission properties, and combinations of waves. The remaining class time will focus on some of the many applications that apply to understanding music, musical instruments, and the listening environment, including an overview of musical recording and reproduction technologies. Especially during the second half of the semester, several classes will have guest artists and craftspeople share their expertise and experiences, particularly with regard to solo and orchestral instruments. We will visit the University carillon and visit a historic pipe organ off-campus.

We should be able to cover most of the textbook. Some sections will be treated carefully, others in summary, and others you will be asked to learn without in-class treatment.

2. ASSUMPTIONS ABOUT BACKGROUND: The level of formal physics is low. Perhaps counter-intuitively, the material and reasoning sometimes must be sophisticated conceptually therefore. Class time thus is important in providing needed insights. See below about attendance policy.

R.J. Bartlett • H.-P. Cheng • E. Deumens • F.E. Harris • S. Hirata • J.L. Krause
D.A. Micha • H.J. Monkhorst • N.Y. Öhrn • A.E. Roitberg • J.R. Sabin • S.B. Trickey

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You will need a basic working knowledge of algebra and geometry and at least know about the elementary trig functions of sine and cosine and about the basics of logarithms. For students with weak math skills and for others who simply need the extra personalized attention, I will provide appropriate help as needed. Knowledge of musical notation, scales, and instruments will be helpful but need not be extensive.

3. Assignments: You are responsible for the concepts presented and/or assigned in class. Learning physics is similar to learning to play a musical instrument – both take practice. Homework problems, however simple, are part of that practice. Therefore you are responsible for completing homework. Students often think they understand a concept, yet are unable to apply it. It is my responsibility as your instructor to assign problems that can help you to genuine understanding. Homework also will serve as one of the bases for test content. Homework will be assigned at least weekly and typically will be due roughly one week later.

4. Examinations and Grading: Grades will be based on 1) 45% for the best 3 scores out of 4 in-class tests, 2) 15% for homework, 3) 25% for the final exam, and 5) 15% for in-class participation. The tests will consist of short answer or multiple choice questions on concepts, simple problems, or key factual information. The final also will include problems and/or analyses of situations. You will be given ample notice before each test.

Regular attendance is significant. Repeated absence and lack of active involvement will be regarded as serious. There will be very short, UNANNOUNCED quizzes, usually about the topic we discussed in the preceding class meeting. Respectable grades will be at your finger tips assuming reasonable involvement. A’s will be awarded to those who jump in full blast and go beyond mastery of the basics. I will post supplementary materials on the class website.

5. Instructor’s Background and Approach: This is my second time teaching this course. I’m indebted to Profs. Len Peterson and Gene Dunnam for sharing their resources and to Prof. Sam Matteson for sharing material from a similar course at the Univ. of North Texas. I’ve changed textbooks. My aim is to provide a fun, enlightening experience. Keep in mind that I am a physicist. One aim of the course, therefore, is for you to learn something of how physicists think about and describe the world. I am not an active musician. I do have some musical training, and am active in the maintenance and installation of pipe organs as a hobby. For some topics, e.g. the physiology of the ear, I am a co-learner, not an expert. My expectation is that some of you will have musical expertise or talents that will be valuable to the
In that same vein, I’ll try to incorporate topics of interest that you suggest if they fit in some reasonable coherent way with the course objectives.

6. **SEQUENCE:** The course will start with ideas of physics vs. esthetics and how physicists think, plus working definitions of some basic physical concepts such as force, pressure, speed, energy, and power. We’ll move right into waves, vibrations, simple harmonic motion (SHM) and its relationship to general periodic motion. (SHM is the conceptual base for all tones.) We will discuss basic mathematical aspects; you will need only a little math in order to understand how SHM fits into the big picture. Next, waves in various media - and sound waves in particular - will be studied. After that we’ll look at how the ear detects tones and how that detected information is perceived. Then we will explore the history of musical scales briefly, followed by the physical basics of many musical instruments and of the human voice. The last segment will include room acoustics, sound reproduction, and electronic music. Throughout the course, there will be frequent demonstrations and hands-on experiences. Sometimes, class material will be independent of the text and based on interesting special topics. I hope to keep the approach flexible without being directionless. Useful information and class summaries will be put on the web or be e-mailed to everyone, starting in about a week.