PHYS 1320 / MPSY 5340 / PHYS 3320

Music & Physics
Fall, 2012

INSTRUCTORS:
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WEB PAGE:
www.physics.smu.edu/~olness
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MEETINGS:
LECTURE: Tuesday & Thursday, 2:00 - 3:20, Fondren Science Rm.158
LAB: Monday (1-3pm) (3-5pm) or (5-7pm), Fondren Science Rm.60

BEWARE: On occasion, lecture and lab may be held in different rooms.
BEWARE: The first lab is on Monday August 27, 2012
BE SURE TO DO THE PRE-LAB IN ADVANCE!!!
(For PHYS 3320, there is a weekly recitation section in place of a lab.)

TEXT: *Note, we are changing to a different text beginning in 2008.*
John Backus (Author)
"The Acoustical Foundations of Music" Hardcover: 384 pages
Publisher: W. W. Norton & Company; 2 edition (December 1977)

REFERENCES:
Selected books will be placed on reserve.

GRADES: Components are:

PHYS 1320	MPSY 5340	PHYS 3320
Exams (50% total)	Exams (50% total)	Exams (40% total)
Daily quizzes (20%)	Daily quizzes (20%)	Daily quizzes (20%)
Laboratory (30%)	Paper & presentation (20%)	Homework (40%)
	Laboratory (10%)	

GROUP PROJECT (PHYS 1320 Only): Students will work in groups of 2 or 3 on a selected project. This will count for 3 quiz-grades. **DUE DATE: TUESDAY NOVEMBER 20, 2012.**

PAPER & PRESENTATION (MPSY 5340 Only): Each student will be responsible for writing a paper 10 to 15 pages in length. You may, if you choose, submit your project in the form of a web page(s). The topic should be either the acoustics (psychoacoustics) of your own instrument or another acoustics topic of your choice. Presentations of this type are usually enhanced by a demonstration.

COMPUTER BASED HOMEWORK (Phys 3320 Only): For those in the upper level physics version, we will have separate homework assignments using both computer algebra and advanced mathematical techniques.

COURSE CONTENT: We will cover both the acoustics (physical sound properties) and the psychoacoustics (psychological, perceptual properties) of music. Topics will include sound in general, sound of musical instruments (including voice), sound characteristics of rooms, electronic production (synthesis) and reproduction of sound.

DEMONSTRATIONS: Demonstrations will be done in class sessions throughout the semester. You are encouraged to make suggestions about interesting ways to demonstrate the phenomena we are studying. Each class discussion will FOLLOW the reading of appropriate material, meaning that you will be expected to have completed the reading PRIOR to the class session for which it is listed. The same for tape listening assignments.

ASSIGNMENTS: Various problem sheets will be distributed for you to complete. Your completion of the problems is optional, and will be for your own benefit. As such, the problem sheets will not be graded. Other assignments, such as completing lab tasks and doing outside investigations will be considered under "participation".

Office Hours As posted, and by appointment. You should also be aware that there are a number of resources available for extra help including the LEC. Contact us for details.

Calculators: A scientific calculator is a must. Necessary functions are sin, cos, tan, exp, log, and roots, as well as the inverse operations. (Note, you need not spend more than about $15 for this. I didn't. I use a TI-30.)

Course Web Page The course web page is linked to www.physics.smu.edu/olness

Prerequisites: (PHYS 1320) No calculus. No advanced math. We shall assume a working knowledge of algebra and trigonometry, and will review the necessary material before it is used.

Quizzes: There will be a short quiz at the beginning of each class. The lowest 3 grades will be dropped **if** you complete your group project. (Note, this includes all missed quizzes, doctors appointments, and other emergencies.) No make up quizzes will be given after the scheduled quiz.

Homework: Physics is not a spectator sport! Homework is assigned for each chapter. I encourage you to work in a study group and to use my office hours if you have difficulty. (Note, I do not need to grade the homework since it will be obvious from the quiz grades who is doing the work.)

Final Exam: The final exam is scheduled for **Tuesday Dec. 11, 2012, 8am-11am**
Be sure to double check the schedule on the web.

Laboratory: The labs are held Monday 1-3pm, 3-5, and 5-7pm. You will need a 1) calculator, 2) spiral lab notebook. There is no laboratory manual to purchase.

There will be a short PRE-LAB ASSIGNMENT due at the beginning of lab to ensure you prepared the material; this counts as a part of the lab grade. You are responsible for obtaining this material in advance.

Final Remark: I'm sure we missed something.

* Disability Accommodations: Students needing academic accommodations for a disability must first contact Disability Accommodations & Success Strategies (DASS) at 214-768-1470 or www.smu.edu/alec/dass.asp to verify the disability and to establish eligibility for accommodations. They should then schedule an appointment with the professor to make appropriate arrangements. (See University Policy No. 2.4; an attachment describes the DASS procedures and relocated office.)

* Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

 Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)

University Curriculum Components and Associated Student Learning Outcomes

Pure and Applied Sciences

To be active, engaged citizens in a global society, graduates of SMU will be able to engage in scholarly discourse in science and engineering and to understand the implications of these disciplines. Students should be aware of the meaning and methods of science and engineering, and of the ways that both disciplines have shaped and continue to shape the world around us. To achieve this goal, students must take two courses, with lab experiences, in the Pure and Applied Science Pillar. Due to the constraints of lab courses, these courses may both be introductory.

Student Learning Outcomes for PHYS 1320:

1. Students will be able to demonstrate basic facility with the methods and approaches of scientific inquiry and problem solving. (Level 1)

2. Students will be able to explain how the concepts and findings of science or technology in general, or of particular sciences or technologies, shape our world. (Level 1 & 2)

NOTE: The Pure and Applied Science requirement can be met with either two introductory courses each with a lab or one introductory with a lab and a more advanced course that may then not have a lab.

Basic Outcomes (knowledge and comprehension)

- Students demonstrate basic facility with the methods and approaches of scientific inquiry and problem-solving.
- Students explain how the concepts and findings of science in general, or of particular sciences, shape our world.
- Students select and apply appropriate techniques, skills, and modern tools to technology activities.
- By the end of this course, all students can describe, on an exam, how a selection of tunings and temperaments are derived, and compare and contrast the advantages and disadvantages of each.
- By the end of this course, all students can describe, on an exam, both the physiological and psychoacoustical details of the ear. Specifically they should be able to describe what happens from the point at which a sound wave enters the outer ear to the point at which the sound "message" leaves the inner ear and heads to the brain.
- By the end of this course, all students can describe, on an exam, the general classes of instruments (ideophone, aerophone, membranophone, chordophone), classify standard orchestral instruments in one of these categories, and describe characteristic resonant frequencies of sample instruments.
- By the end of this course, all students can compute, on an exam, the reverberation time for a specified hall, and describe the primary features that will affect the performance quality of this room for different musical ensembles.
- By the end of this course, all students can describe, on an exam, the fundamental features of wave phenomena including reflection, refraction, interference, and diffraction. The students can also provide examples of each phenomena for both light and water waves.
- By the end of this course, all students can describe, on an exam, the use of the Fletcher-Munson curves of equal-loudness contours, and distinguish intensity, intensity level, loudness, and loudness level.

1. Student Learning Outcomes.

Upon successful completion of this course, students will meet the expectations from the Quantitative Reasoning student learning outcomes:

Students will be able to develop quantitative models appropriate to problems in Physics.

Students will be able to assess the strengths and limitations of quantitative models and methods used in Physics.

Students will be able to apply symbolic systems of representation.

Students will be able to collect, organize and analyze data from a variety of sources.

Students will be able to formulate structured and logical arguments.

Students will be able to test hypotheses and make recommendations or predictions based on results.

Students will be able to communicate and represent quantitative information or results numerically, symbolically, aurally, visually, verbally, or in writing.

Students will also meet these expectations from Pure and Applied Sciences student learning outcomes:

Students will be able to demonstrate basic facility with the methods and approaches of scientific inquiry and problem solving.

Students will be able to explain how the concepts and findings of science or technology in general, or of particular sciences or technologies, shape our world.

How this course achieves these Student Learning Outcomes:

The above objectives will be achieved through: participation in in-class discussion of lecture and reading materials; discussion with the lead instructor(s) of reading and lecture during regular office hours; successful completion of routine homework assignments; successful completion of in-class quizzes and several in-class examinations. In addition, students will participate in a weekly laboratory component that is included in this course. This will enhance the above objectives with hands-on application of principles learned from lecture and reading.