PHYS 1320 / MPSY 5340 / PHYS 3320

Music & Physics
Fall, 2013

INSTRUCTORS:
Fredrick I. Olness (office 201FS, phone 768-2500, olness@smu.edu)
Thomas W. Tunks (phone 768-3454)

WEB PAGE:

www.physics.smu.edu/~olness
www.smu.edu/ttunks

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 26, 2013
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) Daily quizzes (20%) Laboratory (30%)	Exams (50% total) Daily quizzes (20%) Paper & presentation (20%) Laboratory (10%)	Exams (40% total) Daily quizzes (20%) Homework (40%)

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 19, 2013.**

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 **Wednesday Dec. 18, 2013, 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 be registered with Disability Accommodations & Success Strategies (DASS) to verify the disability and to establish eligibility for accommodations. Students may call 214-768-1470 or visit http://www.smu.edu/alec/dass.asp to begin the process. Once registered, students should then schedule an appointment with the professor to make appropriate arrangements.

• 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)

• Student Learning Outcomes: Please include in your syllabi all student learning outcomes, both those specific to your course, as well as those that satisfy major and general education requirements.

• Final Exams: Final course examinations shall be given in all courses where they are appropriate, and some form of final assessment is essential. Final exams or final assessments must be administered as specified in the official examination schedule, and shall not be administered during the last week of classes or during the Reading Period. Please state clearly in the syllabus the date/time and form of the final exam or assessment.

University Curriculum Components and Associated Student Learning Outcomes

Student Learning Outcomes: Pillar: Pure and Applied Science:

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.

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)

Student Learning Outcomes: *Quantitative Reasoning*

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

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

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

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

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.

SMU MEMORANDUM

August 18, 2013

To: Students of Physics 1320/3320/5340
From: Professor Fredrick Olness
Subject: Regrading Exams and Quizzes

Please follow guidelines when submitting papers for a regrade:

- Please do not write on the paper. If you have done so by accident, please make a note to this effect on a separate sheet of paper. This is important as papers are Xeroxed at random.

- Please write the reason you desire a regrade on a separate sheet of paper. Only written requests will be examined. Be specific and detailed. If you are questioning the partial credit, be sure to point out what you did wrong, and why you think it deserves more points.

- Please turn in all papers for regrades within **two days** after the papers are returned. After this deadline, we will not accept any papers for a regrade, even if you deserved the points. (We can not keep regrading all semester.)

- Please be aware that we reserve the right to review **all** problems on a paper, not just the ones you asked us to look at. *This also means that your score during a regrade can go down as well as up.*

Fredrick Olness; Department of Physics; SMU; 768-2500; 768-2495; FAX: 768-4095;

STANDARD DISCLAIMER: This product is meant for educational purposes only. Any resemblance to real persons, living or dead, is purely coincidental. Void where prohibited. Some assembly required. List each check separately by bank number. Batteries not included. Contents may settle during shipment. Use only as directed. No other warranty expressed or implied. Do not use while operating a motor vehicle or heavy equipment. Postage will be paid by addressee. Subject to CAB approval. This is not an offer to sell securities. Apply only to affected area. May be too intense for some viewers. Do not stamp. Use other side for additional listings. For recreational use only. Do not disturb. All models over 18 years of age. If condition persists, consult your physician. No user-serviceable parts inside. Freshest if eaten before date on carton. Subject to change without notice. Times approximate. Simulated picture. No postage necessary if mailed in the United States. Please remain seated until the ride has come to a complete stop. Breaking seal constitutes acceptance of agreement. For off-road use only. As seen on TV. One size fits all. Many suitcases look alike. Contains a substantial amount of non-tobacco ingredients. Colors may, in time, fade. We have sent the forms which seem right for you. Slippery when wet. For office use only. Not affiliated with the American Red Cross. Warranty void if serviced by non-authorized personnel. Drop in any mailbox. Edited for television. Keep cool; process promptly. Post office will not deliver without postage. List was current at time of printing. Return to sender, no forwarding order on file, unable to forward. Not responsible for direct, indirect, incidental or consequential damages resulting from any defect, error or failure to perform. At participating locations only. Not the Beatles. Don't try this in your living room; these are trained professionals. Penalty for private use. See label for sequence. Substantial penalty for early withdrawal. Do not write below this line. Falling rock. Lost ticket pays maximum rate. Kilroy was here. Your cancelled check is your receipt. Add toner. Ceci n'est pas une pipe. Place stamp here. Avoid contact with skin. Sanitized for your protection. Be sure each item is properly endorsed. Sign here without admitting guilt. Out to lunch. Slightly higher west of the Mississippi. Employees and their families are not eligible. Beware of dog. Contestants have been briefed on some questions before the show. Limited time offer, call now to ensure prompt delivery. You must be present to win. No passes accepted for this engagement. No purchase necessary. May be hazardous to health if consumed in excessive quantities. Not responsible for typographical errors. No returns unless defective. Processed at location stamped in code at top of carton. Don't even think about parking here. Shading within a garment may occur. Use only in a well-ventilated area. Keep away from fire or flames. Replace with same type. Do not put the base of this ladder on frozen manure. Approved for veterans. Booths for two or more. Check here if tax deductible. Some equipment shown is optional. Price does not include taxes. No Canadian coins. Not recommended for children. Under penalty of law, this tag not to be removed except by consumer. Prerecorded for this time zone. Reproduction strictly prohibited. No solicitors. No alcohol, dogs or horses. No anchovies unless otherwise specified. Restaurant package, not for resale. List at least two alternate dates. First pull up, then pull down. Call toll free number before digging. Driver does not carry cash. Some of the trademarks mentioned in this product appear for identification purposes only. Objects in mirror may be closer than they appear. Record additional transactions on back of previous stub. Unix is a registered trademark of AT&T. Do not fold, spindle or mutilate. No transfers issued until the bus comes to a complete stop. Package sold by weight, not volume. Your mileage may vary. This supersedes all previous notices unless indicated otherwise.

	PHYS 1320/ MPSY 5340/PHYS 3320: Fall 2013, TUNKS & OLNESS				
#	**DAY**	**LECTURE:**	**NOTES:**	**Chpt**	**TOPIC**
1	TUE	08/27/13	First Class	0	Introduction and course overview
2	THUR	08/29/13		1	Basic physical quantities - Ch. 1
3	TUE	09/03/13		2	Simple vibrating systems - Ch. 2
4	THUR	09/05/13		3	Waves and wave propagation - Ch. 3
5	TUE	09/10/13		4	Complex vibration and resonance - Ch. 4
6	THUR	09/12/13		4	Complex vibration (continued)
7	TUE	09/17/13		5	The Ear and hearing - Ch.5 to p. 91
8	THUR	09/19/13		5	Hearing and review
9	TUE	09/24/13	**EXAM 1**		**Chpts. 1-5**
10	THUR	09/26/13		5	Go over Exam I; & Intensity: Ch.5, p.91-10
11	TUE	10/01/13		6	Timbre - Ch. 6
12	THUR	10/03/13		7	Frequency and Pitch - Ch. 7
13	TUE	10/08/13		8	Intervals and tuning - Ch. 8
14	THUR	10/10/13		8	Tuning (continued) and review for Exam II
	TUE	10/15/13	**Fall Break**		
15	THUR	10/17/13	**EXAM 2**		**Chpts. 5-8**
16	TUE	10/22/13		10	Strings - Ch. 10
17	THUR	10/24/13		11	Strings (continued)
18	TUE	10/29/13		11	Woodwinds
19	THUR	10/31/13		11	Woodwinds (cont)
20	TUE	11/05/13		13	Piano - Ch. 13
21	THUR	11/07/13	Drop Date	13	Piano (continued) and Voice
22	TUE	11/12/13			Voice (continued) and organ
23	THUR	11/14/13		9	Room Acoustics
24	TUE	11/19/13		9	Room Acoustics
25	THUR	11/21/13		12	Brass - Ch. 12
26	TUE	11/26/13		12	Brass (continued)
27	THUR	11/28/13	**Thanksgiving**		
28	TUE	12/03/13		14	Percussion - Ch. 14
29	THUR	12/05/13	Last Class	14	Project Presentations
	WED	**Dec 18**	**FINAL EXAM**		**Wednesday Dec. 18, 2013, 8am-11ar**
	Adjustments may be made depending on student interests/needs and unplanned events				

PHYS 1320/ MPSY 5340 Fall 2013 TUNKS & OLNESS			
DAY	**NOTES**	**#**	**LAB**
Aug 26	FIRST LAB	**1**	**Measurement and Errors**
Sep 2	*Labor Day*		
Sep 9		**2**	**Speed of Sound**
Sep 16		**3**	**Velocity of Sound in Resonant Tubes**
Sep 23		**4**	**Transverse Waves**
Sep 30		**5**	**Simple musical instruments:**
Oct 7		**6**	**Computer based labs**
Oct 14	Fall Break		
Oct 21		***7***	***Fourier Transforms***
Oct 28		***8***	***Diffraction and Interference***
Nov 4		***9***	***Resonant Flame tube***
Nov 11		***10***	***Oscilloscope experiments***
Nov 18		***11***	***Standing wave patters in 2-D***
Nov 25		**-**	***last day to hand in labs***