PHYS 1320 / PHYS 3320

Music & Physics
Fall, 2025

INSTRUCTORS:
Fredrick I. Olness (office 201FS, phone 768-2500, olness@smu.edu)
George Baker (Meadows gbaker@smu.edu)

COURSE WEB PAGE:
Linked from below under "Physics Courses"
www.physics.smu.edu/olness

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 September 8
BE SURE TO DO THE PRE-LAB IN ADVANCE!!!
(For PHYS 3320, there is a weekly recitation section in place of a lab.)

TEXT:
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%)

CLASS PROJECT: Students will work On a selected project. This will count for 3 quiz-grades. This can be a presentation in class, or a written report. **DUE DATE: Tuesday December 2, 2025.**

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.)
For excused absences for officially sanctioned university events you may make arrangements to take the quiz in **advance**. 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
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.

PHYS 1320/ PHYS 3320: Fall 2025

#	DAY	LECTURE:	NOTES:	Chpt	TOPIC
1	TUE	Aug-26	First Class	0	Introduction and course overview
2	THUR	Aug-28		1	Basic physical quantities - Ch. 1
3	TUE	Sep-2		2	Simple vibrating systems - Ch. 2
4	THUR	Sep-4		3	Waves and wave propagation - Ch. 3
5	TUE	Sep-9		3	Waves and wave propagation - Ch. 3
6	THUR	Sep-11		4	Complex vibration
7	TUE	Sep-16		4	Complex vibration (continued)
8	THUR	Sep-18		5	The Ear and hearing
9	TUE	Sep-23		5	The Ear and hearing
10	THUR	Sep-25		5	Review for exam
11	TUE	Sep-30	**EXAM 1**		**Chpts. 1-5**

PHYS 1320/ MPSY 5340 Fall 2025 BAKER & OLNESS

	DAY	NOTES	#	LAB
MON	Aug 25		0	no lab
MON	Sep 1	Labor Day		
MON	Sep 8	FIRST LAB	1	Measurement and Errors
MON	Sep 15		2	Speed of Sound
MON	Sep 22		3	Velocity of Sound in Resonant Tubes
MON	Sep 29		4	Transverse Waves
MON	Oct 6		5	Simple musical instruments:
MON	Oct 13	Rotating Lab	6	Fourier Transforms
MON	Oct 20	Fall Break		
MON	Oct 27	Rotating Lab	7	Diffraction and Interference
MON	Nov 3	Rotating Lab	8	Resonant Flame tube
MON	Nov 10	Rotating Lab	9	Oscilloscope experiments
MON	Nov 17	Rotating Lab	10	Standing wave patters in 2-D
MON	Nov 24	Make up day		Can make up ONLY one lab
MON	Dec 1		-	last day to hand in labs

SMU MEMORANDUM

August 21, 2025

To: Students of Phys1320/Phys3320
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 **three 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.

Quantitative Applications

Student Learning Outcome: Students will demonstrate an ability to solve problems within a specified domain through quantitative reasoning.

The Value of Quantitative Applications

Quantitative Applications courses provide students the ability to apply the tools of mathematical and/or statistical analysis to a wide range of subject areas. Students in these courses use information to solve problems in disciplines ranging from the Sciences and Engineering, to Business, to the Social Sciences and Humanities. These courses promote numeracy and data literacy as skills that enhance the understanding of any topic or subject. Quantitative Applications courses reinforce the quantitative skills developed in the Quantitative Reasoning Foundation.

Supporting Skills

1. Students will identify the appropriate quantitative methods needed to solve domain specific problems.
2. Students will apply appropriate quantitative methods to formulate solutions to domain specific problems.
3. Students will solve domain specific problems through quantitative reasoning.

Course Content Criteria

1. Courses in this category require students to solve problems through the manipulation or analysis of numerical data within a specified domain.
2. Courses in this category require students to identify, select, and recognize numerical data appropriate to solving specific problems, within a specified domain.
3. Courses in this category require students to draw inferences and/or conclusions from visual, numeric, symbolic, and verbal representations of information, within a specified domain.
4. Courses in this category include an assessment assignment that requires students to demonstrate each of the skills in the Quantitative Applications Assessment Rubric (below). This assessment assignment should be one of the following: a homework assignment an objective exam, an essay question on an exam, an essay, or a research paper

Glossary

Glossary

1. **Domain**: A specific area of activity, expertise, or knowledge.
2. **Manipulation or analysis of numerical data**: Performing a technique in order toaggregate isolated information into a value or representation that can allow for appropriate interpretation in the context of the data.

Experience Criteria

Students may apply to fulfill the QA requirement through a co-curricular activity. These criteria apply to experiences that meet the QA curricular requirement and describe the characteristics of the experience, the steps a student must follow to petition the experience for approval, and the number and types of assignments students must submit to satisfy the requirement.

1. Students must obtain pre-approval for any activity used to satisfy this component. Approval must be obtained prior to the start of the activity.
2. Students must submit independent, third-party, verification of participation in the approved activity, by a supervisor or other authoritative individual, who is not a blood relation.
3. Activities in fulfillment of this requirement require students to spend at least fifteen total hours solving problems through the manipulation or analysis of numerical data within a specified domain.
4. Activities in fulfillment of this requirement require students to identify, select, and organize numerical data appropriate to solving specific problems within a specified domain.
5. Activities in fulfillment of this requirement require students to draw inferences and/or conclusions from visual, numeric, symbolic, and verbal representations of information, within a specified domain.
6. Students fulfilling Quantitative Applications through an activity must submit either samples of work completed during the activity that demonstrate the student solving problems through the manipulation or analysis of numerical data or a written reflection of approximately 1000 words that responds to the following prompt:

Please describe in detail the activity you used to complete the Quantitative Applications requirement. In your reflection, answer the following questions. How did you meet the requirement of using quantitative data to solve problems? What resources did you use to understand how best to solve the problems through quantitative reasoning? Who provided feedback on your problem-solving method? How did your ability to solve problems through quantitative reasoning improve?

Quantitative Application Assessment Rubric

Supporting Skills	Exemplary 5	Accomplished 4	Developing 3	Beginning 2	Absent 1
Students will identify the appropriate quantitative methods to solve domain specific problems.	Student is consistently able to identify an appropriate method for solving specific problems,	Student is often able to identify an appropriate method for domain specific problems,	Student is able to identify the most basic, appropriate method for domain specific problems,	Student can sometimes identify the most basic, appropriate method for domain specific problems,	Student is unable to identify an appropriate method for domain specificproblems.
Students will apply appropriate quantitative methods to formulate solutions to domain specific problems.	Student is consistently able to apply appropriate quantitative methods to formulate solutions to domain specific problems.	Student is often able to apply appropriate quantitative methods to formulate solutions to domain specific problems.	Student is able to apply the most basic quantitative methods to formulate solutions to domain specific problems.	Student is sometimes able to apply the most basic methods to formulate solutions to domain specific problems.	Student is unable to apply the appropriate methods to formulate solutions to domain specific problems.
Students will solve domain specific problems through quantitative reasoning.	Student is able, with a high degree of accuracy, to solve domain specific problems.	Student is able, with a relative degree of accuracy, to solve domain specific problems.	Student is able, with a relative degree of accuracy, to solve domain specific problems.	Student demonstrates limited ability to solve domain specific problems.	Student is unable to solve domain specific problems.

SMU

Office of Information Technology

EXPLORE SMU

SMU Required Syllabus Statements

Title IX and Disability Accommodations

Disability Accommodations	Students who need academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit smu.edu/DASS to begin the process. Once they are registered and approved, students then submit a DASS Accommodation Letter through the electronic portal, *DASS Link,* and then communicate directly with each of their instructors to make appropriate arrangements. Please note that accommodations are not retroactive, but rather require advance notice in order to implement.
Sexual Harassment	All forms of sexual harassment, including sexual assault, dating violence, domestic violence and stalking, are violations of SMU's Title IX Sexual Harassment Policy and may also violate Texas law. Students who wish to file a complaint or to receive more information about the grievance process may contact Samantha Thomas, SMU's Title IX Coordinator, at accessequity@smu.edu or 214-768-3601. Please note that faculty and staff are mandatory reporters. If students notify faculty or staff of sexual harassment, they must report it to the Title IX Coordinator. For more information about sexual harassment, including resources available to assist students, please visit smu.edu/sexualharassment.
Pregnant and Parenting Students	Under Title IX, students who are pregnant or parenting may request academic adjustments by contacting the Office of Student Advocacy and Support by calling 214-768-4564. Students seeking assistance must schedule an appointment with their professors as early as possible, present a letter from the Office of the Dean of Students, and make appropriate arrangements. Please note that academic adjustments are not retroactive and, when feasible, require advance notice to implement.

Academic Policies

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. Click here for a list of holidays.
Medical-Related Absences	To ensure academic continuity and avoid any course penalties, students should follow procedures described by their instructors in order to be provided with appropriate modifications to assignments, deadlines, and exams.

NEED HELP?

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 that were missed as a result of their participation. It is the responsibility of the student to make arrangements for make-up work with the instructor prior to any missed scheduled examinations or other missed assignments. (See current Catalog under heading of "Academic Records/Excused Absences.")
Final Exams	Final course examinations shall be given in all courses where appropriate, and some form of final assessment is essential. Final examinations and assessments must be administered as specified in the official examination schedule and cannot be administered or due during the last week of classes or during the Reading Period. Syllabi must clearly state the form of the final examination or assessment, and the due date and time must match the official SMU examination schedule. SMU policy states that all exceptions to the examination schedule may be made only upon written recommendation of the chair of the department sponsoring the course and with the concurrence of the dean of that school, who will allow exceptions only in accordance with guidelines from the Office of the Provost.
Academic Dishonesty	Students are expected to embrace and uphold the SMU Honor Code. Violations of the Honor Code will be acted upon in accordance with the policies and procedures outlined in the Mustang Student Handbook.

Student Support

Student Academic Success Programs	Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Canvas. Students who would like support for subject-specific tutoring or success strategies should contact SASP, Loyd All Sports Center, Suite 202; 214-768-3648; smu.edu/sasp. Tutor schedules are available at smu.edu/tutorschedule.
Caring Community Connections Program	CCC is a resource for anyone in the SMU community to refer students of concern to the Office of the Dean of Students. The online referral form can be found at smu.edu/deanofstudentsccc. After a referral form is submitted, students will be contacted to discuss the concern, strategize options, and be connected to appropriate resources. Anyone who is unclear about what steps to take if they have concerns about students should contact the Office of the Dean of Students at 214-768-4564.
Mental Health Resources:Counseling Services & Teletherapy	Throughout the academic year, students may encounter different stressors or go through life experiences which impact their mental health and academic performance. Students who are in distress or have concerns about their mental health can schedule a same-day or next-day appointment to speak with a counselor by calling Counseling Services. Counselors are available at any time, day or night for students in crisis at this number: 214-768-2277 (then select option 2) They will be connected with a counselor immediately. Students seeking ongoing counseling should call the same number (214-768-2277, then select option 1) during normal business hours to schedule an initial appointment. SMU Teletherapy provides another free option for on-demand counseling and video appointments with a medical professional.

Optional language

Campus Carry Law	In accordance with Texas Senate Bill 11, also known as the 'campus carry' law, and following consultation with entire University community, SMU chooses to remain a weapons-free campus. Specifically, SMU prohibits possession of weapons (either openly or in a concealed manner) on campus. For more information, please see smu.edu/campuscarrylaw.