Physics 521 / Engineering 515

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Office Hours:	T 09:00 – 10:00 am NCPA; By appointment in NCPA except Thursdays.	Class Time:	MWF 11:00 am NCPA 1128

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Text

Kinsler, Frey, Coppens and Sanders. Fundamentals of Acoustics. Wiley; 4th edition, ISBN-10: 0471847895, ISBN-13: 978-0471847892. Earlier editions are acceptable, however all homework will be assigned from the 4th edition.

Description

This course is an introduction to sound, oscillatory motion, waves and vibrations. Waves in 1, 2 and 3 dimensions will be studied with emphasis on sound waves. Only linear acoustics will be covered. Knowledge of introductory undergraduate physics and basic undergraduate math is assumed. Please consult the Prerequisite Knowledge sheet for more details.

Prerequisites/Corequisites

Phys 402, graduate status or consent of instructor.

Course Objectives: On completion of this course, students should be able to do the following.

- *Basic vibration and acoustics calculations and derivations.* Solve vibration problems involving resonances in 1, 2 and 3 dimensions. Derive the acoustic wave equation. Calculate sound levels, reflection and transmission coefficients.
- *Conceptual and qualitative descriptions of acoustic phenomena.* Explain what sound is and how it propagates. Explain how sound can be generated and detected. Describe the pressure field of simple sound sources.
- *Applications.* Use basic acoustic principles to explain acoustic phenomena.
- *Practical.* Measure the speed of a wave.

Evaluation

Grade Scale: Total points – 1000.

- $90\% \leq \mathbf{A} \leq 100\%$
- $88\% \leq \mathbf{A}- < 90\%$
- $84\% \leq \mathbf{B}+ < 88\%$
- $80\% \leq \mathbf{B} < 84\%$
- $76\% \leq \mathbf{B}- < 80$
- $72\% \leq \mathbf{C}+ < 76\%$
- $70\% \leq \mathbf{C} < 72\%$
- $64\% \leq \mathbf{C}- < 70\%$
- $50\% \leq \mathbf{D} < 64\%$
- $\mathbf{F} < 50\%$

Method of Evaluation: Several catagories of assignments, weighted as described below.

Preliminary Tests (5%)

- An in-class preliminary test covering prerequisite and assumed knowledge will be given the first week of class. (2.5%)
- The same preliminary test will be given as a take-home test. (2.5%)

Major Tests (40%)

- 3 closed-book tests; equally weighted.

Homework (40%)

- Homework sets will be assigned and must be turned in at the beginning of class on the due date. No late homework will be accepted.
- Students are encouraged to work together to solve homework problems however, no student should copy solutions from another student or from online solutions wholesale.
- Students will be asked to present solutions to homework problems on the board in class.
- Homework solutions must be presented according to the homework rubric. Homework that differs from the rubric in presentation will not be graded.

Practical (5%)

Students will perform measurements of waves on strings in the laboratory. A lab report must be turned in for this practical exercise. The practical will replace one week of lecture. Students will be asked to select two preferred times to perform the experiment and will be assigned a 3 hour time slot to complete it.

Presentation (10%)

Each student must select an acoustics topic for classroom presentation. This can be the student's own research, basic acoustics or acoustics applications. Students must get approval for their topic before presenting to determine whether it is appropriate. Presentations should be no longer than 15 minutes and should be accompanied by a written abstract to be turned in before the presentation. The grade will be based on the quality of the abstract (compactness and completeness, grammar and composition) and content and the quality of the presentation (oral, visual, organization, clarity). Please consult the Guidelines for Presentations sheet. Computers and projectors will be available in the classroom for Powerpoint, Beamer or PDF presentations. Students must attend ALL presentations. Presentations will take place the last two weeks of class.

Final exam (optional for A students; to replace one test)

Students who have an A- or higher grade after all assignments except the final have been turned in are not required to take the final and the A or A- grade will be assigned as the final letter grade. All other students must take the final exam. The final exam grade, if higher, will replace the lowest major test grade except if a student does not show up to take the final. If that occurs, the lowest major test grade will be replaced by a zero final exam grade.

Policies

Attendance

Class attendance is strongly advised. University of Mississippi policy requires that attendance be verified for every student during the first two weeks of classes. In this course, verification will take place on the Monday of the second week of class, therefore all students must be present on that day. Students whose attendance is not verified will be automatically dropped from the course. On days when tests are scheduled, attendance is required. If you must be absent on a test day, you must speak to me before the test to determine whether the absence will be excused and whether the test will be rescheduled. If the absence is unexpected, you must contact me by email or telephone within 24 hours subsequent to the absence or **no** tests will be rescheduled under any circumstances.

Academic Integrity

Every student of the University of Mississippi, by virtue of choosing to be part of the university community agrees to abide by the University of Mississippi Creed which covers academic integrity. Cheating on any assignment is forbidden and, in this course, will result in a zero grade on the given assignment. If a second case of cheating occurs, this will result in an F for the entire course. Please consult the Academic Integrity document for details on university policy and the academic creed.

University of Mississippi Access and Inclusion

The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation or to accurate assessment of your achievement, please contact the course instructor as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content or the use of non-captioned or non-transcribed video and audio files. Students must also contact Student Disability Services at 662-915-7128 so that office can 1) provide you with an Instructor Notification form, 2) facilitate the removal of barriers and 3) ensure you have equal access to the same opportunities for success that are available to all students.

Important Dates: For the full academic calender please visit http://registrar.olemiss.edu/fall-2016/

- August 22 – classes begin
- September 2 – last day to add
- October 3 – deadline for course withdrawals
- November 21 – 25 - Thanksgiving break
- December 2 – last day of class
- December 8 at noon – Final exam

The acoustic spectrum