

PHY 360: Vibrations, Waves, and Optics Fall 2011

Prof. Richard Schnee, Room 331 Physics, 3-2579, rwschnee@physics.syr.edu

Grader: Naeem Shahid, Room 361 Physics, 3-5975, mnshahid@physics.syr.edu

Course Description

Physics 360 is a course on Vibrations, Waves, and Optics. This set of topics includes some of the coolest ideas in physics. They are accessible with just one year's background in calculus-based physics. Once you start to notice it, you will realize that vibrations and waves occur everywhere, and play a central role in a huge range of physics problems. Even better, the ideas in this course make a great lead-up to a study of quantum mechanics; a substantial portion of what seems weirdest about QM comes directly from involving waves in the description of "particle" motion.

Course Objectives

The learning goals of PHY 360 are

1. Acquire knowledge about a variety of physical phenomena, including:
 - o vibration
 - o examples of harmonic oscillators
 - o superposition
 - o driven oscillations and resonance
 - o coupled oscillators and normal modes
 - o normal modes of continuous systems
 - o Fourier analysis
 - o group velocity and wave packets
 - o diffraction
 - o interference
 - o geometrical optics
 - o wave properties of light
2. Gain an appreciation of the wide applicability of vibration and wave concepts, and
3. Build physical intuition and experience with the mathematical description of physical phenomena.

Textbook

The vast majority of the course will be based on the textbook *Vibrations and Waves* by A. P. French. This is a classic text. We will follow it closely, and most homework problems will be drawn from it. It is available at the S.U.B.

You will use one (or both) of the texts used for PHY 211-212 or PHY 215-216 (Knight or Young & Freeman) when we cover optics in the latter part of the course. Some copies may be available for loan to students without either text.

Course Work

The class will meet on Tuesdays and Thursdays from 2:00 to 3:20 p.m in Physics Building 104N (on the ground floor; 104S is home of the Physics Clinic, where you may drop in for help from a gradute student). Studies indicate that you can learn only a limited amount of information from lecture alone, no matter how clear or entertaining. Therefore, each class will be composed of a series of mini-lectures that will be augmented by questions and collaborative discussions. Sometimes you will answer multiple-choice questions by holding up a folded sheet displaying your answer (a "paper clicker"). Your active engagement is very important, and will be expected. 10% of the grade will come from participation points earned by volunteering to work example problems at the board, by asking good questions, by sharing your answers to questions, and by the quality of answers on "3-minute quizzes" that will be a part of every class. Usually, the 3-minute quiz will consist of a single (complete) sentence answering what was the most important fact learned in class that day, and one saying what was the most confusing part of class that day.

There will be homework based on each class, with an assignment including problems based on two or three classes due most Thursdays at the beginning of class (late homework will receive half credit if turned in by the Tuesday after its due date).

Instructions for solving physics problems and information on how homework will be graded is posted on Blackboard under "Assignments." The homework for this course is more challenging than in most 200-level physics courses; the problems will often be unlike examples treated in the text or in class. Time spent figuring out how to solve the homework problems is likely to be your most effective time learning the material, so keeping up with the homework is crucial. Exams will draw in part from the homework problems, so doing the homework each week is the best way to prepare for exams.

Exams

There will be two midterm exams, given during regular class periods on the dates listed in the Course Calendar. The Final Exam will be held on Friday, December 16 from 8:00 am-10:00 am as indicated by the university registrar. The final exam will be cumulative, with about half the questions about material covered since the last midterm exam.

Office Hours

Prof. Schnee will hold office hours at times TBA in Room 331 Physics Building. You are welcome to schedule an appointment for a meeting at another time; please use email to rwschnee@physics.syr.edu to set up an appointment.

Grading

Grades will be computed according to the following weighting scheme: Better mid-term exam: 20%; worse mid-term exam: 15%; Final Exam 35%; homework 20%; class participation 10%. The minimum score needed to earn a given grade is as follows:

93% A	88% A-	83% B+
78% B	73% B-	68% C+
63% C	58% C-	48% D

You are not in competition with your classmates and you should help each other; I will be very happy if everyone learns the material well enough to earn an A.

Academic Integrity

The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams, in laboratories, and in assignments, as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. For more information and the complete policy, see <http://academicintegrity.syr.edu>

Working with friends can be very helpful in learning a difficult subject like physics. In this course, I encourage you to find other classmates with whom to study and discuss homework. However, you must always generate your final homework solutions by yourself (do not copy homework solutions). Any course work to which you sign your name, whether it is a homework assignment or an examination, must represent your own work. We will take seriously any violations.

Academic Accomodation

Our community values diversity and seeks to promote meaningful access to educational opportunities for all students. Syracuse University and I are committed to your success and to supporting Section 504 of the Rehabilitation Act of 1973 as amended and the Americans with Disabilities Act (1990). This means that In general no individual who is otherwise qualified shall be excluded from participation in, be denied benefits of, or be subjected to discrimination under any program or activity, solely by reason of having a disability.

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), <http://disabilityservices.syr.edu> located at 804 University Avenue, Room 309, or call 315-443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented disabilities "Accommodation Authorization Letters," as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

Religious Observations

SU's religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class. For this course, students with religious observance on a day that homework is due may turn in the homework on the next day without penalty, and students missing class due to a notified religious observance will not have their class participation score penalized due to the missed class.

PHY 360 Course Calendar (Fall 2011)

Tue 30 Aug	French Chapter 1, pp. 3-7	Problems 1-11	Due 9/8
Thu 1 Sep	French Chapter 1, pp. 7-16	Problems 1-5, 1-7, 1-10, 1-12	Due 9/8
Tue 6 Sep	French Chapter 2, pp. 19-27	Problems 2-3	Due 9/8
Thu 8 Sep	French Chapter 3, pp. 41-45, 51-53	Problems 3-1, 3-2, 3-5	Due 9/15
Tue 13 Sep	French Chapter 3, pp. 45-51, 54-57	Problems 3-6, 3-9	Due 9/15
Thu 15 Sep	French Chapter 3, pp. 62-68	Problems 3-12, 3-13, 3-14, 3-15	Due 9/22
Tue 20 Sep	French Chapter 4, pp. 77-82	Problem 4-1	Due 9/22
Thu 22 Sep	French Chapter 4, pp. 82-92	Problems 4-4, 4-6	Due 9/29
Tue 27 Sep	French Chapter 4, pp. 92-101	Problems 4-3, 4-7, 4-13	Due 9/29
Thu 29 Sep	French Chapter 5, pp. 119-129	Problems 5-2, 5-6	Due 10/13
Tue 4 Oct	Midterm Exam #1 on Chapters 1, 2, 3, 4		
Thu 6 Oct	French Chapter 5, pp. 129-135 (Guest Prof. Saulson)	Problems 5-9, 5-10	Due 10/13
Tue 11 Oct	French Chapter 5, pp. 135-146	Problems 5-12, 5-14	Due 10/13
Thu 13 Oct	French Chapter 6, pp. 161-167	Problems 6-1, 6-2	Due 10/20
Tue 18 Oct	French Chapter 6, pp. 168-178	Problems 6-10, 6-11	Due 10/20
Thu 20 Oct	French Chapter 6, pp. 181-196	Problems 6-14, 6-15	Due 10/27
Tue 25 Oct	French Chapter 7, pp. 201-209, 213-216	Problems 7-2, 7-5	Due 10/27
Thu 27 Oct	French Chapter 7, pp. 216-223 (Guest Prof. LaHaye)	Problem 7-8	Due 11/3
Tue 1 Nov	French Chapter 7, pp. 223-230	Problems 7-9, 7-12	Due 11/3
Thu 3 Nov	French Chapter 8, pp. 253-259, 264-267	Posted on Blackboard Assignments	Due 11/17
Tue 8 Nov	Midterm Exam #2 on Chapters 5, 6, and 7		
Thu 10 Nov	French Chapter 8, pp. 267-280	Posted on Blackboard Assignments	Due 11/17
Tue 15 Nov	Y&F 35, pp. 1207-1226, or Knight 21.5-21.7, 22.2, 22.6 pp. 647-658, 672-676, 687-691	Posted on Blackboard Assignments	Due 11/17
Thu 17 Nov	Y&F 36.2-36.5, pp.1236-1249, or Knight 22.3-22.5, pp. 678-687 and Y&F 36.3-36.4 (posted)	Posted on Blackboard Assignments	Due 12/1
Tue 29 Nov	Y&F 33.1-33.4, 33.7, pp.1121-1133, 1144-1146, or Knight 23.1-23.3, 23.5, pp. 700-711, 713-716	Posted on Blackboard Assignments	Due 12/1
Thu 1 Dec	Y&F 34.1, 34.3-34.4, pp.1157-1161, 1169-1182, or Knight 23.4, 23.6-23.7, pp. 711-713, 716-727	Posted on Blackboard Assignments	Due 12/8
Tue 6 Dec	Y&F 34.5-34.8, pp.1182-195, or Knight 24.1-24.4 pp. 739-753	Posted on Blackboard Assignments	Due 12/8
Thu 8 Dec	Y&F 36.6-36.7, pp.1250-1256, or Knight 24.5, 25.2-25.4, pp. 753-756, 766-776		
Fri 16 Dec	FINAL EXAM (8:00 - 10:00 a.m.)		