Physics 312 – Wave Phenomena

Wittenberg University
Spring 2008
Jeremiah Williams

http://userpages.wittenberg.edu/jwilliams/courses/Ph312/index.html

Contact Information:

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Class Schedule:

Class Meetings: MWF 10:20 –11:20 AM Sci 304
Lab Meeting: T 12:30 –3:10 PM Sci 304
Final: Saturday, May 3, 2008 3:30 – 6:30 PM

Primary Text:

Required
• 2 quadrille-ruled, bound lab notebook

Recommended
• A book of integral tables is always useful. I recommend the Mathematical Handbook of Formulas and Tables in the Schaum’s Outline Series. It is compact, portable and contains much of what you will need in your undergraduate studies.

Course Description

Wittenberg Catalog Course Description: Unified treatment of the general properties of waves, including the mathematical representation of acoustic and electromagnetic waves, refraction, propagation, interference, diffraction, and geometrical optics. One three-hour lab per week.

Prerequisites: Physics 220 and 218. Mathematics 212 and 215 recommended. Writing intensive.

I assume that you have already taken the introductory physics sequence and have a basic understanding of differential and integral calculus. I also assume a basic knowledge of vectors and vector algebra. Additional mathematical concepts will be introduced or reviewed as necessary.

Like all upper-division physics courses, this will be a challenging and, hopefully, rewarding course. A substantial amount of material will be covered this semester, which means that the pace of this course will be rapid. As such, it is imperative for you to keep up to date with the material. It also means that YOU must let me know if the pace is too fast (or slow).

The schedule will be determined and adapted to best fit your needs and interests.
Course Policies:

Attendance: Class participation and attendance in the lecture portion of this course are not mandatory and do not directly contribute to your course grade. However, much of what we discuss in class will be directly related to the exam questions and the homework sets. Therefore, it is in your best interest to attend and be actively engaged in class. If you miss a class, it is your responsibility to get the assignments and to submit them on time. Participation in the laboratory component of this course is required.

Grade Determination: All assignments will be graded on an absolute scale. At the end of the semester a normalization may be applied to the total absolute grades for the entire class to determine each individual's final grade. The course grade will be determined using the scheme below. Given the importance of the laboratory component of this course, you must pass the laboratory component in order to pass this course.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
</tr>
<tr>
<td>Exams</td>
<td>30% (to be equally divided among the exams given)</td>
</tr>
<tr>
<td>Lab</td>
<td>25%</td>
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<tr>
<td>Final</td>
<td>20%</td>
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Homework: Homework will be assigned throughout the semester and your solutions will due at the start of class on the due date. Your solutions will be returned to you later in the day and you will have a chance to revise your solutions. These revisions will be due at the start of the next class meeting. Each problem is worth 10 points, with up to 5 points possible on your initial submission and the remaining 5 points earned for the revised submission. If your initial solution is correct, no revision will be needed and you will receive all 10 of the available points. Solutions will be posted after the final version has been submitted. Late solutions will not be accepted.

Your homework solutions should be organized, written, legible (typed or written in pen) and written on one side of the page. Your answer should be clearly labeled (boxed, highlighted, bold, etc.) and you are expected to justify your answer by showing your work and by stating, in words, what you are doing. Full credit will not be given without some words describing the physics being used.

In addition to the homework solutions that you submit, it is expected that you will keep up with the course reading and are prepared for each class meeting.

Exams: Unless otherwise noted, exams will be timed and given in class. You will be allowed to use your brain and a writing instrument. Additionally, a copy of the Mathematical Handbook of Formulas and Tables in the Schaum’s Outline Series will be provided. You are welcome to use your own copy or similar handbook, provided that it is approved by the instructor in advance. The use of anything else is considered as a case of academic dishonesty.

The exact date of the exams will be announced in class at least one week in advance. Exams must be taken at the stated times, except by prior agreement. Makeup exams will only be given if there is unavoidable and documented conflict. The final will not be given early, except under extraordinary circumstances. If there is a conflict, it is your responsibility to contact the instructor as far in advance as possible.

Accommodations: Any student with a documented disability who needs to arrange reasonable accommodations must contact each instructor at the beginning of the semester. Please contact Lisa Rhine, Assistant Provost for Academic Services at 937-327-7924 in room 208 Recitation Hall to coordinate accommodations and receive self-identification letters for each instructor.
Regarding Academic Honesty:

The important guiding principle of academic honesty is that you must never represent the work of others as your own. While it is expected that you will abide by the Wittenberg Honor Statement, the following guidelines should help govern your behavior in the course; please request clarification if you find yourself in any doubtful situations.

You are encouraged to seek assistance from the instructor, from your fellow students or from anyone you think would be useful with the homework and with preparing for class discussions. You are also encouraged to work with other members of your class on these assignments, as it is often very beneficial in the learning process. However, whatever you turn in MUST be your own work. Simply copying someone else's work is clearly a representation of work as your own and is a case of academic dishonesty. Exams must be entirely your own work. Detailed instructions will be given on the exams themselves and discussed in advance. No collaboration of any sort is allowed once an exam begins.

Course Schedule:

There will not be a detailed course schedule for this course. In my experience, it is very difficult to stick to a course schedule in an upper-level course and these courses are much more enjoyable when there is greater flexibility in the choice of topics and the pace of coverage. As a result, the pace and content of the course will be determined as the course progresses. This means that you will have to be engaged with the course, providing feedback on what your interest are and if the pace of coverage is too fast (or slow).

Useful Advice:

You will get more out of this course if you are actively engaged. To that end, below are a few pieces of advice.

1. If you are having trouble, ask for help. There are a number of resources available to you, including the office hours that are provided by the instructor, other faculty in the department and your peers.

2. Prepare for class by reviewing your class notes between lectures and reading the relevant portions of your text before coming to class, so that you can come to class prepared to ask questions.

3. The only way to learn physics is by doing it. This means that you should read with pen in hand to work out things described only briefly in the text or lecture and work extra problems if you need feel you need additional practice. I am happy to provide additional problems, if you let me know.

4. Don't spend more than a few hours on a single homework problem. If you are stumped, show clearly where you're stumped and then ask for help.

5. Peruse the posted solution to problems and exams.

6. Don’t get (too) frustrated if you are having trouble. Physics is hard. But, with practice and perseverance, it is all worth it.

As always, this syllabus is subject to change.
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Class Schedule:

The laboratory component of Physics 312 (Wave Phenomena) is scheduled for Tuesdays from 12:30 until 3:10 PM. We will meet at 12:30 PM on Tuesdays for up to an hour to discuss the lab and related elements. The lab will be completed by you during the week, at your convenience.

Course Materials:

- Two (possibly more) quadrille-ruled, bound lab notebook and a pen.
- A scientific calculator may be useful.
- Lab procedures will be provided in advance of the lab meeting.

Course Objectives:

- To learn how to keep a lab notebook.
- To learn how to communicate your results in written form.
- To learn how to deal with experimental uncertainty.

Course Policies:

Writing Intensive: This course is writing intensive, which means that there will be a focus on clarity and precision in presenting your work in a written format. In particular, there will be an emphasis on the use of a laboratory notebook and formal write-ups of your results (described in more detail below). Additionally, given the importance of peer review in written scientific communication, peer review will be used later in the semester to provide useful criticism as you revise your work.

Grade Determination: The laboratory portion of this course constitutes 25% of your course grade and to pass the course, you must pass the laboratory component. The grade in this laboratory component of this course will be determined using the following scheme:

       Lab Notebook: 40 %
       Lab “reports”  40 %
       Participation: 20 %
**Lab Notebook:** A lab notebook is intended to be an honest "working documents" that describes what you are doing and why. It should be used not only during lab, but also for taking notes (in the library, etc). As this course progresses, you will develop techniques that will allow you to produce a record of thought and analysis which are clearly of professional quality. The following should be kept in mind while you are moving through this course.

- Your lab notebook should be open and you should be taking notes when you are working on aspects related to your experimental work (research, taking and analyzing data, etc.). It is **not** something to be recreated after the fact.

- You should always write with the idea that you are working towards the production of a formal paper - the more you keep this in mind while maintaining your notebook, the easier it will be when it finally comes time to assemble a paper.

- All entries must be made in pen and you should never erase anything (ever). If an error is made, cross it out with a single line with a comment stating why the data was crossed out. Only use a single line – you may find later that you need what you crossed out and if you use a single line, it is still accessible.

- A lab notebook should be neat and organized.

- You should use the right hand pages for permanent records and the left hand pages or the back of the book for scratch.

- Each time you come to lab, a dated entry should be made in the notebook.

- The Table of Contents should list dates as well as page numbers.

**Lab “Reports”:** No matter how great your results are, they are worthless unless you are able to communicate them in either a written or oral format. In this course, we will focus on the written format. By the end of this course, it is expected that you will be able to write a professional paper based on work that you do. In particular, you will be expected to write a professional paper using the 4th Edition of the AIP Style Manual ([http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html)) in a form that is suitable for submission to the American Journal of Physics ([http://www.kzoo.edu/aip/docs/information.html](http://www.kzoo.edu/aip/docs/information.html)). There is an obvious transition to write in his format and to facilitate this transition, the writing process will be a focus of this course. Since this is a focus, late assignments will not be accepted. Additionally, peer-review will be used later in the course to provide constructive feedback on your writing.

**Participation:** Since this a laboratory, you are expected to come prepared and participate in the experiments. Your participation grade will be based on my observations of your work and your partners evaluation of you engagement in the lab.

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