Syllabus

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Physics 211--Vibrations, Waves and Optics

Fall 2016

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Office Hours: Mon 11 - 11:50 am, Wed 3 - 4 pm, Fri 3 - 4 pm

Letter to Students

This course constitutes the third in the four-course introductory calculus-based sequence in physics. We will focus on harmonic motion, wa
optics. The course is intended to form a conceptual and mathematical bridge to the topics in modern physics that you will encounter next s
Retired Professor Larry Robinson designed and implemented many of the experiments that we will undertake this semester. In this seventh
which I assume responsibility for the course and a continue to make a make few changes in both his successful design and other alteration
by Professor Baker last Fall. I want you to be aware that we in the Department are continually seeking to improve. If at any time you have
suggestions for changes that would assist your understanding, please don't hesitate to tell me.

I do hope you are looking forward to this experience as much as I am.

Sincerely,

Don Salisbury

Course Description

This course will introduce you to the study of mechanical vibrations, waves, and optics. Subjects to be studied include oscillations and reso one-dimensional wave motion, partial derivatives, and the one-dimensional wave equation. Additional topics include an introduction to Four analysis, and sound waves. After a brief study of Maxwell's equations, an overview of the principles of geometrical optics will presented, an interference, and diffraction of light waves, including holography, will be the final topics in the course.

Student Learning Outcomes

After completing this course, students will be able to

- Predict, observe, experiment, analyze, and compare predictions and observations,
- Describe the physical world with conceptual models,
- Test these models with experimental, theoretical, and computational techniques,
- Solve problems by synthesizing physical concepts and applying them to new situations,
- Discuss physical concepts, experimental design, and theoretical foundations in a collaborative group setting,
- Write clear, concise laboratory reports with sufficient details,
- Represent physical ideas through mathematical symbols and/or numerical models,
- Apply quantitative skills to solve problems, and
- Visualize physical phenomena both pictorially and graphically.

To achieve these outcomes, activities in this course will

- Continue in the Workshop Physics tradition of active engagement. In many respects, this course will adopt a "flipped cla philosophy; you will be expected to read and learn basic concepts prior to attending class.Our time in class will be focused on (rather than lectures) to help solidify your understanding of vibrations, waves, and optics.
- Raise the mathematical level of students by introducing concepts from ordinary differential equations, partial derivatives differential equations (especially the wave equation), and Fourier techniques as applied to physical systems.
- Introduce and apply *Mathematica* to the study of physics. The Physics Department believes that *Mathematica* can excite, eng empower students of physics to solve problems that otherwise would be intractable.
- Begin the formal study of measurement theory, experiment analysis and design. This will be done primarily through carefully laboratory exercises that illuminate and extend the ideas discussed in class.

Required Texts

1. The main text for the course is the sixth edition of *Physics for Scientists and Engineers* by Paul Tipler and Gene Mosca (W.H. Freeman an Company, 2008).

2. The text that focuses on measurement theory and experiment design/analysis is *Experimentation* by D.C. Baird published by Prentice-Ha We will call on this reference many times in our laboratory work this semester.

2. *Schaum's Outline of Mathematica (Second Edition)* by Eugene Don (McGraw-Hill, 2009) will provide a reference for *Mathematica*. *Mathem* an incredibly powerful computational tool that you will use in most all of the physics courses at AC. This volume is not required, but strongly suggested--it will serve you well in all succeeding physics courses.

I strongly encourage you to keep these volumes once this course ends. Each in its own way will be a valuable resource in future co

Roles and Responsibilities

You are expected to take an active role in your learning before, during, and after class.How much you learn and how much you grow de on you.Your responsibilities include:

- ***Attend all class meetings.***This course requires student participation and group interaction.To get the full benefit from this class (an other college courses as well), you should attend all class sessions.
- ***Engage actively in all learning activities.***This course will utilize a flipped classroom approach.This means you will be responsible fo learning material, which traditionally would be covered in lecture, outside of class.In-class activities will include group discussions, hands-on demonstrations, homework-type problems, and lectures on an as-needed basis.Lab activities will refine your scientific sk and thus require your active participation.You should be prepared to participate fully during all meeting times.
- ***Work outside of the classroom.***You should spend at least 6 hours each week outside of class reading the textbook, taking notes, do homework, and working on lab assignments.
- ***Read the textbook carefully***. You are expected to read the appropriate sections in your textbook before class.On Mondays, you wil in hand-written study notes from your reading.
- ***Be curious and inquisitive.*** In fact, as you penetrate deeper into nature's mysteries I predict that you will be astounded that simpl can so efficiently describe the vast variety if vibration and wave phenomena.

Course Requirements and Grading

- ***Participation***. Active participation in this course is expected, and attendance at all sessions is required.
- ***Lab Activities.***You must participate in and complete all laboratory exercises; copying from a member of the class after an absence v considered plagiarism. Each of you will make presentations in class during the term, giving the experimental results and conclusion obtained by your group on the previous experiment.
- ***Homework***. Homework assignments, whether from lab or class, are due at the beginning of class on the due date.Study notes from textbook readings are due on Monday, calculation problems on Wednesday, and conceptual problems on Friday.
- ***Exams***.There will be three in-class tests and a final, comprehensive exam.The final exam grade will be substituted for the lowest tes grade if that benefits you.

Class Participation	5%
Lab + Lab HW	20%
Homework	15%
Exams	60%
Total	**100%**

Grading Scale
A 90-100
B 80-90
C 70-80
D 60-70
F below 60

The numerical values for specific letter grades may be changed at the discretion of the professor, but the minimum value will not be r example, the minimum value for a B may be below 80 but it will not be changed to a value above 80.

ELR 8/07, Revised DCS 8/16

Academic Integrity

In this course, you will be working often in small groups in the laboratory to complete assignments.We encourage collaborative learnin your peers.However, all written assignments, quizzes, and exams must be your own work.If you have any doubts about work on an assi speak with the instructor before you turn in the work in question. Students who engage in academic dishonesty will be referred to the President of Academic Affairs and possibly the Academic Integrity Council. Students who violate the Academic Integrity Principle risk fa entire course. Please see Austin College's Academic Integrity Principle in the 2016-2017 *Environment*.

These general policies apply unless the instructor distributes explicit, written instructions to the contrary. According to a recent survey on ca there appear to be some differences between faculty and student understanding of specific instances of unpermitted behavior. One hundred of faculty responding to the survey view all items on the following list as unpermitted behaviors.

1. Turning in work done by someone else.
2. Working on an assignment with others when the instructor asked for individual work.
3. Receiving unpermitted help on an assignment.
4. Writing or providing a paper for another student.
5. Getting Q/A from someone who has taken test.
6. In a course requiring computer work, copying a friend's program rather than doing your own.
7. Helping someone else cheat on a test.
8. Falsifying lab or research data.
9. Fabricating or falsifying a bibliography.
10. Copying from another student during a test or examination **without** his or her knowing it.
11. Copying from another student during a test **with** his or her knowledge.
12. Copying a few sentences of material from a written source without footnoting them in a paper.
13. Turning in a paper either purchased or plagiarized, in large part, from a term paper "mill" or website.
14. Copying a few sentences of material from an Internet source without footnoting them in a paper.
15. Using unpermitted crib notes (cheat sheets) during a test.
16. Copying material almost word for word from any written source and turning it in as your own work.
17. Altering graded test and submitting it for additional credit.
18. Turning in a paper copied from another student.
19. Using a false excuse to obtain extension on due date.
20. Hiding or damaging library/course material.
21. Cheating on a test in any other way
22. Cheating on a written assignment in any other way.

Accommodations

If you anticipate accessibility issues related to the format or requirements of the course, please meet with the instructor so that we can solutions. Austin College seeks to provide reasonable accommodations for all individuals with disabilities and will comply with all applic federal, state, and local laws, regulations, and guidelines. It is the responsibility of the student to register with and provide verification academic accommodation needs to the Director of the Academic Skills Center as soon as possible. The student also must contact the in in a timely manner to arrange for reasonable academic accommodations. For further assistance, please contact the office at 903-813-2 visit the Academic Skills Center.

Changes to the Course

The instructor reserves the right to modify course requirements and course schedule, if such changes will provide a better learning exp

for the students.

Safety and Equipment Use

You will be using state-of-the-art equipment in the laboratory.Safety is of the utmost importance.Below are some general guidelines to

- Conduct yourself in a responsible manner at all times.
- Pay attention and be aware.
- Dress appropriately for laboratory work.
- Know the location of safety equipment in the room (fire extinguishers, eye wash, fume hood, etc.)
- Do not eat or drink in the laboratory.
- Maintain a clean environment and remove all obstacles from your work area.
- Treat all equipment with care and respect.
- Treat all participants with care and respect.
- Inform the instructor immediately if equipment is damaged or is not working properly.
- Inform the instructor immediately if you are damaged.

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