

Portland State University
Department of Physics

Physics 203: General Physics: Waves, Optics, and Modern Physics
Spring 2009: 10am-11:50am, SB1 #107

Instructor: Ralf Widenhorn

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Office hours: Mo 2pm- 3pm and Th 12pm-1pm in SB2 #450

Text: Giambattista, Richardson, Richardson, College Physics 2/e

Web: <http://www.physics.pdx.edu/~ralfw/physics/>

Course outline:

The course covers: oscillation of a mass on a spring, periodic motion of a pendulum, Sound (Doppler effect, beat...), waves, superposition and interference, electromagnetic radiation, geometrical optics, lenses, mirror, optical instruments, diffraction, basics of relativity, introduction to quantum mechanics: Wave-Particle duality, Heisenberg Uncertainty principle, some basics of atomic and nuclear physics.

Grading:

The course grade will be determined from three exams. They will count 25%, 35%, and 40% respectively. The exam with your lowest score will be counted least; the one where you received the highest score will be counted most. So even if you didn't do well on the first exam, not everything is lost. You can still improve your grade significantly by doing better on the next two. The grade of each exam follows the traditional scale:

- 90% or better is an A/A
- 80% to 89% is a B/B⁺
- 70% to 79% is a C/C⁺
- 60% to 69% is a D

Homework:

The homework problems are listed below and solutions are posted on my webpage. Here, you will learn how to apply the concepts from the lecture to solve actual problems. Doing the homework should also help you to review the material and prepare for the exams. **Keeping up with the homework is essential for doing well in this class.**

Guided solutions to most homework problems are also available on ARIS (www.aris.mhhe.com) (physics, Giambattista, Richardson, Richardson, College Physics 2/e). To get to the material for this course enter the section code 6F7-A4-66C. For first time ARIS users: To use the guided solution you need to sign-up for ARIS (unfortunately it is not free) at www.aris.mhhe.com. There is also a self study guide component to ARIS which is free of charge. Go to (www.aris.mhhe.com) (physics,

Giambattista, Richardson, Richardson, College Physics 2/e) and click on the “Self Study” tab.

Chapter	Conceptual Questions	Problems
10	6,7,9,11,17	28,30,34,35,44,46,49,55,57,58,60,62,63,69,71,75,76,82,89
11	1,2,4,9,12	1,3,5,9,11,12,14,15,18,20,23,33,36,37,40,42,43,49,53,55,56,59
12	2,4,7,9,15,17	1,10,11,12,16,20,23,29,31,34,35,37,41,46,51,53,62,63,68,71
22	6,7,10,12,16	9,12,14,17,20,24,25,31,34,40,42,43,48,52,58,60,61
23	1,2,4,7,11,14,17,20,22	6,7,10,14,15,17,18,31,35,36,39,40,41,47,49,50,52,62,64,65,73,74,76,79,81,89,92,97
24	1,4,5,9,10,12,15,17,19	1,5,6,14,18,19,21,25,26,27,30,32,40,42,43,48,49,52,71,74
25	3,5,6,9,16,19	1,3,12,14,20,21,27,31,32,35,36,37,47,48,50,53,55,56,67,72
26	2,4,6,7,8,9,11	1,3,4,6,8,9,10,13,16,19,20,28,30,34,36,38,39,44,45,53,66,71,80
27	1,2,3,5,8,12	2,4,6,7,18,21,23,24,28,29
28	4,15,16	1,4,5,7,10,18,21,23,26

Exams:

There will be three exams. They will cover the following chapters:

04/21/08 10:00am - 11:50am Exam 1: Ch10.5-10.10, Ch11, Ch12

05/14/08 10:00am - 11:50am Exam 2: Ch22 – Ch24

06/09/08 10:15am - 12:05pm Exam 3: Ch25, Ch26, parts of Ch27, Ch28

The exams are non-comprehensive, but exam 2 and exam 3 may include general concepts already covered in the previous exams.

The exams will contain two parts. The first Part will be multiple-choice (no partial credit) and the second part will contain problems that have to be solved in detail (you can receive partial credit for those problems). You can bring one piece of paper (8.5” x 11”) with **handwritten notes** to the exams.

Make-up exams are on June 10th at 6 pm in #113 SB2.

Make-up exams will be only given in case of emergencies or illness (with proof).

Part of the class prior to the exams will be spent reviewing homework problems (e-mail me beforehand which problems were most difficult). I will also post a sample exam (from last year’s class) on my webpage.

Extra credit:

1. Multiple Choice: (maximum of 10 points extra credit)

There will be a short in-class Multiple Choice Quiz every week (unless announced differently the quizzes are given on the following days: 04/07, 04/14, 04/28, 05/05, 05/12, 05/21, 05/28, 06/04). I will ignore your two lowest scores (or missed MC) and calculate the average percentage of the other quizzes. This

percentage multiplied by 10 points gives you the Multiple Choice Quiz extra credit.

2. Workshop or Term paper (5 points extra credit)

a.) Workshop

Complete the class "Workshop for Ph203" successfully. The workshops meet weekly for 1h50min sessions. It is a one credit class and you need to sign-up for it (the schedule is on my webpage). To pass the workshop students must attend all workshops and participate actively. You will work under the guidance of a workshop leader in small groups on problems sets corresponding to the material of the general physics lecture.

b.) Term paper

Write a term paper on a topic which is relevant to this course. Some possible topics are listed below, but you are free to choose another subject that sparks your interest. You need to submit an outline of your paper, with a list of references **by April 30th**. The paper should be 6-8 pages long (double spaced, font size 12) plus pages with figures and references. The paper is due before the final exam. **I only accept papers of people that have submitted the outline. No late work will be accepted for the outline and the paper submission. Please bring a hardcopy to class and do not e-mail your outline or paper.**

- Ultrasound
- The physics of musical instruments
- Fresnel lenses
- Fiber optics
- The physics of microscopes (optical, electron...)
- Measuring the speed of light
- The History of the development of quantum mechanics
- The Heisenberg uncertainty principle

Here is an example on how to calculate your final grade:

Exam 1: 75, Exam 2: 90, Exam 3: 65, 70% of the extra credit MC, attended workshop

Total score= $(0.4 \times 90) + (0.35 \times 75) + (0.25 \times 65) + 7 \text{ (MC)} + 5 \text{ (Workshop)} = 90.5 \rightarrow A^-$
best exam 2nd best exam 3rd best exam extra credit

(Without the extra credit the same exam grades would have resulted in a C⁺)