

Portland State University  
Department of Physics

Physics 203: General Physics: Waves, Optics, and Modern Physics  
Spring 2007: 10am-11:50am

**Instructor:** Ralf Widenhorn

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**Office hours:** Monday and Thursday from 12pm to 1pm in SB1 #42

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

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

Username: physics, password: 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<sup>+</sup>
- 70% to 79% is a C/C<sup>+</sup>
- 60% to 69% is a D

## Homework:

Homework problems will be assigned but won't be graded. The homework is meant to help applying the concepts from the lecture and to review the covered theory. Solutions to the homework will be posted as pdf files on my web page. Most homework problems are also available on ARIS ([www.aris.mhhe.com](http://www.aris.mhhe.com)) and can be submitted electronically for extra credit. For first time ARIS users: You need to sign-up for ARIS at [www.aris.mhhe.com](http://www.aris.mhhe.com) using the registration code in your textbook (please contact me if you don't have a valid registration code). To get to the material for this course enter the section code 6AF-EC-67A.

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:

04/24/06 10:00am - 11:50am Exam 1: Ch10.5-10.10, Ch11, Ch12

05/17/06 10:00am - 11:50am Exam 2: Ch22 – Ch24

06/12/06 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, I will post some sample multiple-choice questions before each exam.) 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 13th 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 some sample multiple-choice questions (taken from previous years exams) before each exam.

### Extra credit:

Choose three of the four options listed below. Each extra credit work is worth five points with a total of up to 15 points. **(NO LATE WORK WILL BE ACCEPTED).**

#### 1. ARIS Bonus Quizzes

There will be 8 bonus quizzes, one for each chapter. You can submit each bonus quiz multiple times and solutions will be available to all students after the due date.

5 points extra credit: Average of your 6 best bonus quizzes is more than 70%.

3 points extra credit: Average of your 6 best bonus quizzes is more than 60%.

or Average of your 5 best bonus quizzes is more than 70%

## 2. ARIS Bonus Homework

Most homework problems (often in a slightly changed form) are available online. The homework to the individual chapters is separated into small pieces, 19 in total. You can repeat the problems as often as you want; hints and guided solutions are available to you. You need to complete 13 of the problems sets with at least 70 % correct.

Note: Some students experienced some technical difficulties with ARIS last term. I decided therefore that you can get extra credit even if you miss some homework or quizzes (see above). Please contact ARIS if experience technical difficulties.

## 3. Term paper

Write a term paper on the topics listed below (other topics with my prior approval only). The paper should be 5-6 pages long (double spaced, font size 12) plus one page with figures and references. The paper is due on the day of the last regular class before the final exam.

- 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

## 4. Workshop

Complete the class “Workshop for Ph203” successfully.

or

I will post the workshop problems on my webpage and you can receive the extra credit by submitting the workshop problem sets to me on the day of the last regular class before the final exam. Your answers will be spot graded and you need to have 70% of the graded problems correct. Get my approval during the first week of class if you choose this option.

Here is one example one how to calculate your final grade:

Exam 1: 75, Exam 2: 90, Exam 3: 65, completed extra credit work (e.g. quizzes, homework, and workshop):

$$\text{Total score} = (0.4 \times 90)_{\text{best exam}} + (0.35 \times 75)_{\text{2}^{\text{nd}} \text{ best exam}} + (0.25 \times 65)_{\text{3}^{\text{rd}} \text{ best exam}} + 15_{\text{extra credit}} = 93.5 \rightarrow A^-$$

(Without the extra credit the same grades would have resulted in a C<sup>+</sup>)