

Physics 221 – Optics and Thermal Physics – Fall 2009
Special Section for Physics Majors

Instructor: Roland E. Allen

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Room 519 ENPH (but moving in November to Room 213 MIST!)

<http://faculty.physics.tamu.edu/allen/Phys221.html>

Office hours: 2:20-3:50 p.m. Monday and Wednesday (or by appointment)

Textbook: Young and Freedman, *University Physics*, 12th edition

(Volumes 1 and 2 if bought separately – and these are easier to carry in a backpack)

Evaluation:

About 8 regular homework problems per week 10%

About 2 challenge problems per week 5%

3 regular exams 60%

Final exam 25%

Homework is due at the beginning of class each Tuesday.

Homework late by < 48 hours, 1/2 credit. Homework late by > 48 hours, no credit.

The exams will be on Thursdays: September 24, October 22, November 19.

Exams will emphasize what was covered (1) in class and (2) in the homework.

You may want to keep a copy of your homework set turned in on the Tuesday preceding each exam, since there will not be time to return it before the exam.

Final Exam: 1:00-3:00 p.m., Wednesday, December 16

Each exam will be preceded by an evening help session on the Tuesday immediately preceding each exam (except Monday before final):

7:00 p.m. in ENPH – Sep. 22 and Oct. 20 (Room 206), Nov. 17 and Dec. 14 (Room 207).

This will be a session in which I respond to your questions over the homework and everything else that we have covered. I.e., there will be no formal review (which would be a waste of valuable time for most people), but a response on all the points that really are of concern to you, with an emphasis on doing the homework problems that presented difficulties.

Extra-credit project: An extra credit (and extra fun) opportunity -- Since we have no lab in this course, it would be desirable to do something that amounts to a superlab: If you wish to exercise this option, organize a team of 1, 2, 3, 4, or even 5 members of the class (including yourself) to create a NEW HIGH-QUALITY demonstration that you will present at the next Physics Festival.

This requires developing a "white paper" proposal with a clear plan and a reasonable budget, and turning it in by October 1. The physics department faculty member who is in charge of the Physics Festival, Dr. Tatiana Erukhimova, will evaluate your proposal and see if it is feasible and worthy. If it is, you will then create the demonstration and commit to presenting it at the next Physics Festival. Depending on the quality of your demonstration (and your individual contribution -- i.e., you must pull your weight on your team), you will receive extra credit worth up to 4 homework assignments.

You will have to prove that your demonstration works by Wednesday, December 9. You might get some sense of the existing demos from <http://physicsfestival.tamu.edu/pictures2009.htm>.

Physics 221 Homework (Special Section for Physics Majors), Fall 2009

Young and Freedman, *University Physics*, 12th edition

The problems labeled C below will be counted as challenge problems, even if they are not labeled that way in the textbook.

In the spaces below where no problems are yet assigned, the chapters are listed just to show the order in which they will be covered.

Problems labeled E will be given out as hard copies in class, and also as pdf files on the website. A few hints on challenge problems are given on the website.

DUE DATE	PROBLEMS
September 8	Chapter 33 - 5, 19, 27, 31, 46, 49, 55, 57, C 65, C 66
September 15	Chapter 34 - 5, 6, 10, 14, 17, 25, 46, 78, C 98, C 119
September 22	Chapter 34 - 36, 40, 41, 47, 48, 57, 85, 114, C 116, C E1
September 29	Chapter 35 - 5, 8, 18, 28, 33, 35, 50, 56, C 59, C 61
October 6	Chapter 36 - 3, 5, 6, 13, 19, 33, 58, 61, C72, C73
October 13	Chapter 36 - 20, 39, 41, 42, 46, 50, 68, 69, C 74, C 75
October 20	Chapter 13 - 10, 15, 32, 40, 48, 56, 62, 87, C 98, C 103
October 27	Chapter 15 - 4, 6, 22, 31, 40, 45, 61, 64, C 81, C 82
November 3	Chapter 16 - 3, 5, 6, 8, 10, 63, 66, 78, C 82, C 83(a),(b),(c)
November 10	Chapter 16 - 19, 27, 30, 49, 50, 52, 70, 77, C 79, C 84
November 17	Chap. 17 - 10, 78, 103, 107, 113, 118, C 125; Chap. 18 - 36, 78, C 92
November 24	Chap. 18 - 47+48, 50, 59 (see pp. 460-461), 85, 86, C 91; Chap. 19 - 1, 3, 11, C 69
December 1	Chapter 19 - 27 (see Table 19.1), 30 (see Eq. (19.17)), 48, 56, 61
December 8	Chapter 20 - 3, 36, 42, 45, 48, C 50, 56, 60, 61, C 63
Final Exam	Roughly half comprehensive, half over material since Exam 3.

Problem C 116: Draw a figure like Fig. 34.10 (a), but with the incident ray parallel to the optic axis. At one point in the derivation, bisect the triangle CP'B.

Problem_C_E1.pdf , C_E1_hint.pdf: See website.

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Problem 35.50: Generalize the argument above Eq. (35.7), and use Eq. (35.8).

Problem C 33.65: The directions of the arrows in Fig. 33.61 seem to be backward. Problem 35.59: For part (a), the answer in the back of the book seems to be backwards.

Problem C 16.82: See Eq. (16.31) and Fig. (16.37). You will need to use some basic trig identities, followed by some algebra.

Problem C 16.83: (a) As in Problem 15.61, the function must have the form $f(x-vt)$. (b): Integrate Eq. (16.3) along each interval, to get a quadratic function (i.e. a parabola) for each segment of the curve. (c): Same hint as for (a).

Problem C 18.92: Generalize Example 18.4.