

PHYSICS 262  
UNIVERSITY OF NEW MEXICO  
FALL 2010

Instructor: Mark Morgan-Tracy

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Course Number: PHYC 262

Section Number: 101

Meeting Place: Regener Hall 103

Meeting Time: MWF 12:00-12:50

Office Hours: Friday 1:00-3:00 PM

Office: Regener Hall 109

Home Page: <http://panda.unm.edu/Courses/morgan-tracy/262/Phys262Spring11.htm>

## Course Description

Welcome to Physics 262, the third semester of calculus based introductory physics. This semester we will be covering optics and “modern” (twentieth century) physics, topics which revolutionized our understanding of the universe. Our starting point will be optics, the study of light, which was forever changed when James Clerk Maxwell was able to show that light (in all its forms) is nothing more than oscillating electric and magnetic fields. We will then move on to Albert Einstein’s theory of special relativity with all of its fascinating and counterintuitive implications about space and time. Finally will come Quantum Mechanics, the triumph of the early twentieth century physics which made us abandon many long-held beliefs about the nature of motion. This semester will make you rethink everything that you have learned before. But in a good way!

I hope that you do well in this course. You will need to work hard to succeed. I can only do so much to cram the concepts that we will cover into your brain. The rest is up to you. If you are willing to really think about what you are reading, to do the homework, and most importantly to let me know when you’re still not getting something, then I’m sure we can have a very successful class for everyone.

Prerequisite: PHYC 161 (General Physics II).

Pre or Corequisite: MATH 264 (Calculus III).

## Text

The textbook used for this class is the 12<sup>th</sup> edition of **University Physics** by Young and Freedman, Pearson Addison-Wesley, 2008.

## Learning Outcomes

The overall objective is that the students can describe physical phenomena using a variety of models and develop certain analytical skills associated with problem solving. By the end of the course, the student should be able to:

- recognize Maxwell's equations
- describe the nature of electromagnetic radiation in terms of electric and magnetic fields
- solve new and different problems dealing with the propagation, polarization, and energy transport of electromagnetic radiation
- sketch ray diagrams showing the geometrical behavior of light in reflection and refraction
- use the wave nature of light to solve new and different interference and diffraction problems
- state the postulates of special relativity and solve related problems
- analyze experimental evidence for the quantum nature of matter and energy
- appreciate the consequences of the wave nature of matter
- identify the Schrödinger equation and interpret its solutions
- describe the basic principles of nuclear physics (time permitting).

## Office Hours

I will be available to provide additional tutoring and to help students with their homework in room 109 (or any open room nearby) of Regener Hall on Fridays after class from 1:00-2:00 PM. From 2:00-2:50, I will be leading the associated problems class, PHYC 267, to which all students are encouraged to register. Even if you are unable to register for the problems class, I will be happy to answer any students questions during that time. I realize that these Friday times will, most likely, be inconvenient to those students who have jobs or other classes, and I encourage you to contact me to set up an appointment for a different time. Email is the best and quickest way of contacting me. I will try my best to accommodate your schedule.

## Course Requirements

I-Clickers: At least once per lecture, I will be giving in-class conceptual quizzes using I-clickers. If you do not have an I-clicker yet, they can be purchased at the bookstore. You must register your I-clicker for the new semester by going to <http://www.iclicker.com/registration> and following the instructions there. Instructions and help on the I-clickers can also be found at <http://panda.unm.edu/Courses/StudentHelp/index.html>. Each I-clicker question will be worth three points with an incorrect answer scoring two points. Non-attendance will result in a zero score. At the end of the semester, five clicker scores will be dropped in determining your average.

Homework: Each week, I will be assigning 5-10 homework problems from the textbook. The purpose of the homework is to make sure that you are keeping pace with the class and understanding the topics being discussed. I encourage you to form study groups with other students in this class and work on the homework together; physics is a collaborative subject.

Each assignment must show all steps and should be neatly written in pencil. Each problem will be given partial credit based on the level of completion and **organization**. Assignments are due by Friday at 3:00

PM and may be turned into me during my office hours. Late homework assignments may be turned in for a 65% participation grade. **I do not drop a homework score!** Homework averages will be based on the maximum class score. If somebody earns the maximum possible homework score, there will be no curve.

Exams: There will be five in-class exams given throughout the semester. (See schedule for dates.) Exams will consist of some, to be determined, combination of multiple choice and written questions. Occasionally there may also be a take-home component which will be due on the day of the exam. Your lowest exam score will be dropped in determining your exam average.

Final Exam: An in-class comprehensive final exam will be given on Friday, May 13 from 10:00 AM -12:00 PM. (Please note the time.) In the event of a UNM closure on the date of the final exam, final grades for students will be calculated based upon the work assessed up to that point.

Course Grade: At the end of the semester, the course grade will be calculated based upon the following percentages. In the case that the average of **all five** exam grades exceeds the homework average, the higher average will be used for your homework score.

I-Clicker	5%
Homework	25%
Exams	50%
Final Exam	20%

Letter grades will be assigned according to the following scale:

<b>A-:</b> 90-92.99	<b>A:</b> 93-98.99	<b>A+:</b> 99-100
<b>B-:</b> 80-82.99	<b>B:</b> 83-86.99	<b>B+:</b> 87-89.99
<b>C-:</b> 70-72.99	<b>C:</b> 73-76.99	<b>C+:</b> 77-79.99
<b>D-:</b> 60-62.99	<b>D:</b> 63-66.99	<b>D+:</b> 67-69.99

## Supplementary Class Material

All supplementary class materials will be posted online. Students are expected to regularly check the class's webpage, <http://panda.unm.edu/Courses/morgan-tracy/262/Phys262Spring11.htm>, to find class announcements, homework assignments and due dates, as well as copies of my lectures notes, and homework solutions.

## Course Calendar

Below you will find a listing of the topics covered in this class along with the corresponding text reading and an estimate of how long I believe it will take to cover them. You will be notified in advance of any changes and what portions of the chapters listed below will be covered.

<u>WEEK</u>	<u>DATE</u>	<u>CHAPTER AND TOPIC</u>
1	Jan 19	Ch. 32 - Electromagnetic Waves
2	Jan 24	Ch. 33 - The Nature and Propagation of Light
3	Jan 27	<b>Last Day to Register</b>
	Jan 31	Ch. 34 - Geometric Optics
4	Feb 4	<b>Exam 1</b>
	Feb 4	<b>Last Day to Drop Without a Grade</b>
	Feb 7	Ch. 35 - Interference
5	Feb 14	Ch. 36 - Diffraction
6	Feb 18	<b>Exam 2</b>
	Feb 21	Ch. 37 - Relativity
7	Feb 28	Ch. 37 (continued)
8	March 7	Ch. 37 (continued)
9	March 11	<b>Exam 3</b>
	March 14-20	<b>Spring Break!</b>
10	March 21	Ch. 38 Photons, Electrons, and Atoms
11	March 28	Ch. 39 Wave Nature of Particles
12	April 1	<b>Exam 4</b>
	April 4	Ch. 40 Quantum Mechanics
13	April 11	Ch. 41 - Atomic Structure
14	Apr 15	<b>Last Day to Drop Without Dean's Permission</b>
	April 18	Ch. 42 - Molecules and Condensed Matter*
15	April 25	Ch. 43 - Nuclear Physics*
16	April 29	<b>Exam 5</b>
	May 2	Ch. 44 - Particle Physics and Cosmology*
	May 6	<b>Last Day to Drop With Dean's Permission</b>
	May 13	<b>Final Exam</b>

\* Selected topics to be covered as time permits.