

Monday and Wednesday
9:30 – 10:45 a.m.
Prof. Andre Adler
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Office Hours: To be posted online.

Lab Section	Day	Time
2	Monday	11:00 am – 12:40 pm
3	Monday	1:00 – 2:40 pm
4	Monday	3:00 – 4:40 pm
5	Monday	5:00 – 6:40 pm
6	Tuesday	9:00 – 10:40 am
7	Tuesday	11:00 am – 12:40 pm

Course Description and Goals

Do you know how electricity is generated and transported? How instruments create music? Why the sky is blue and why there are rainbows? What makes refrigerator magnets stick? How do computers work? How your computer monitor and plasma screen TV produce their colors and pictures?

All of the devices that define contemporary living are applications of basic scientific discoveries. The principles underlying these devices are fascinating as well as useful, and explain as well many of the natural features and phenomena of the world around us. This course familiarizes you with some basic principles of physics through their applications to selected devices such as CD and DVD players, the basic electronic components of computers, lasers and LEDs, why the sky is blue, how rainbows are made, and lenses. In learning the basic physics behind these modern inventions, you will develop a deeper understanding of how the physical world works and gain a new appreciation of everyday phenomena that are ordinarily taken for granted. The course is designed for non-science students with an interest in the natural world. The basic physical ideas needed to understand how things operate are presented using some mathematics, but none beyond elementary high school-level algebra and the binary number system.

Course texts and text website

1. A WileyPLUS access code – includes an e-book of *How Things Work: The Physics of Everyday Life, 5th Edition* by Louis A. Bloomfield, John Wiley and Sons. Purchasing access will be required to do the online homework assignments.

WileyPLUS can be obtained at the campus bookstore, or direct from Wiley at www.wiley.com
WileyPLUS website for MAP-UA 214: <http://edugen.wileyplus.com/edugen/class/cls374144/>

2. *How Things Work Laboratory Manual*. Available at the NYU Bookstore.

Examination Schedule and Student Assessment

Examination 1:	15%	February 26
Examination 2:	15%	April 9
Final examination:	20%	May 14, 8:00 am – 9:50 am
Laboratory:	25%	
WileyPlus Online Homework:	25%	

Examinations and homework will be in the multiple-choice format.

Important: Excused absences from the exams without prior notice will be given **only** in the case of sudden illness (and will then require a doctor's note). If you know in advance that you will not be here on an exam

date for the observance of a religious holiday, *you must notify your instructor in advance, in writing, at least two weeks before the exam date.* A different exam date will then be arranged for you. **All other absences will be considered unexcused and will result in a grade of zero for that exam.** (So please set a backup alarm or have a reliable friend call you that morning if there's a chance you might otherwise miss the exam. We will make absolutely no exceptions to this policy.)

Please note: The examinations, homework assignments, and labs, provides a more than adequate basis for you to demonstrate how well you've learned the material and for us to determine an accurate course grade. There will be no exceptions in grade assessment made for anyone; in particular, extra credit papers or assignments will not be allowed. Please understand that this is to ensure fairness and uniformity of grading standards for everyone.

Laboratory Sessions

These weekly sessions are an important part of the course. You must be registered for one lab section. You will have to submit a lab report for each experiment performed. The lab report has to include answers to all questions and any data you may have collected. The lab report will be due in lab *one week* after the experiment has been performed. **The laboratory sessions will be held in Meyer161 and will begin the week of February 3rd.**

Attendance The lab instructor will deduct points from your lab grade for arriving late or leaving early.

Absence Policy As with the exams, excused absences will only be given in the case of illness (with a doctor's note) or observation of a religious holiday. You must notify your lab instructor in advance in writing if you miss a lab due to religious reasons. All other absences will be considered unexcused and will result in a lab grade of zero. **You cannot make up a lab by attending a laboratory session that you are not registered for.**

Late Lab Reports Late lab reports will be penalized for each day late (excluding weekends). If you wish to submit a late lab report you must do so only at your laboratory instructor's office.

Lab Instructors Each lab instructor will hold a weekly office hour where you can discuss lecture and laboratory material. Office locations and office hour schedule will be announced in lab.

Homework

Homework is done online using WileyPlus. The WileyPlus course website address is <http://edugen.wileyplus.com/edugen/class/cls374144/>

The problem sets are not examinations hence, before they are due, you may discuss them with other students and the instructor after you have thought about them yourself. The true purpose of these problem sets is to help you understand the material, so there is no value in struggling unsuccessfully to understand them on your own.

Late Homework Assignments Late assignments will be penalized by assigning a maximum score of 50%.

Lectures

Lectures are to help you learn the material, clarify what you are responsible for and to help you succeed on exams. It is recommended that you complete the readings before the material is discussed in lecture.

<i>Date</i>	<i>Readings and Lecture Topic</i>
M Jan 27	9.2 String Instruments –sound; music; vibrations in strings, fundamental frequency and harmonics (overtones), standing and traveling waves.
W Jan 29	9.2 Wind Instruments – transverse and longitudinal waves; vibrations in air; fundamental and higher order modes; superposition.
M Feb 3	10.1 Static Electricity – electric charge, electrostatic force: Coulomb's law, electric fields, atomic basis of electricity.
W Feb 5	10.1 Static Electricity – electrostatic potential energy, charging by contact, electrical conductors and insulators, voltage.
M Feb 10	10.2 Electric Fields – electric fields and voltage gradients, electric fields inside and outside conductors.
W Feb 12	10.2 Electric Fields – discharges, charging by induction, capacitors.
M Feb 17	<i>No Class</i>
W Feb 19	10.3 Current – electric current, electric circuits; direction of current flow; electric resistance.
M Feb 24	10.3 Electric Circuits – voltage drops; voltage rises; relationship among current, voltage and power; Ohm's Law; resistors; series and parallel circuits.
W Feb 26	Exam 1
M Mar 3	11.1 Magnets – magnetostatic forces, ferromagnetism, magnetic polarization, magnetic domains, magnetic materials.
W Mar 5	11.1 Magnets – magnetic fields, magnetic flux lines, relationship between electric currents and magnetic fields.
M Mar 10	11.2 Electric Power Distribution – direct and alternating currents, transformers, electromagnetic induction, magnetic field energy.
W Mar 12	11.2 Electric Power Distribution – relationship between changing magnetic fields and electric fields; Lenz's law, inductors, induced emf; motors and generators.
M Mar 24	13.1 Sunlight – light, Rayleigh scattering; index of refraction; refraction, reflection and dispersion
W Mar 26	13.1 Sunlight – interference in electromagnetic waves.
M Mar 31	13.2 Discharge Lamps – color vision, primary colors of light and pigment, orbitals, shells, ground and excited states.
W Apr 2	13.2 Discharge Lamps – wave particle duality; atomic energy orbitals; Pauli exclusion principle; radiative transitions; Planck's constant, atomic fluorescence, radiation trapping
M Apr 7	13.3 LEDs and Lasers – levels in solids; band structure; metals, insulators and semiconductors; photoconductors
W Apr 9	Exam 2
M Apr 14	13.3 LEDs and Lasers – p-n junction; diodes; light-emitting diodes; spontaneous and stimulated emission; population inversion
W Apr 16	14.1 Lenses – converging lenses, real images; focal length; the lens equation.
M Apr 21	14.1 Lenses – diverging lenses, virtual images, vision correction.
W Apr 23	14.2 Optical Recording and Communication – analog vs. digital representations, decimal and binary representations
M Apr 28	14.2 Optical Recording and Communication – diffraction and diffraction limit
W Apr 30	14.3 Audio Players - transistors, MOSFETs
M May 5	14.3 Audio Players - bits and bytes; logic elements
W May 7	Catch-Up
M May 12	Review for Final Exam

Laboratory Instructors and Weekly Schedule of Laboratories

Laboratories are held in Meyer 161.

Zachary Forbes	zdf202@nyu.edu	Lab Sections 2, 3 and 7
Brandon Booth-Dunbar	bkb235@nyu.edu	Lab Sections 4, 5 and 6

<i>Week of</i>	<i>Weekly Lab</i>
January 27	<i>No lab</i>
February 3	Math Review
February 10	Speed of Sound
February 17	<i>No lab due to President's Day on Monday</i>
February 24	Current Flow and Ohm's Law
March 3	Capacitors
March 10	<i>No lab</i>
March 17	<i>No lab due to Spring Break</i>
March 24	Reflection, Refraction and Dispersion Part I
March 31	Reflection, Refraction and Dispersion Part II
April 7	Spectroscopic Analysis of Light
April 14	Photoelectric Effect
April 21	Geometrical Optics
April 28	Young's Experiment
May 5	Review for Final Exam