PHY232: Electricity, magnetism and light
SPRING 2008

LECTURER: Dr. David C. Latimer
EMAIL: latimer@pa.uky.edu
OFFICE: CP 387D
OFFICE HOURS: WF 2:00–3:00 PM; R 3:00–4:00 PM; or by appointment.
PHONE: (859) 257-4729
LECTURE MEETING: **A** MWF 9:00am–9:50am in CP 153.
B MWF 10:00am–10:50am in CP 153.
TEXTBOOK: Serway and Jewett, *Physics for Scientists and Engineers*, 7th edition, Brooks Cole (2007).
COURSE SITE: http://www.pa.uky.edu/∼latimer/phy232s08/

Course description and goals:
PHY 232 is an introduction to the factual content, concepts, thinking skills, and techniques of physics. Physics is one of the most fundamental of the sciences, and a good understanding of it is important for many types of work. We will focus upon electricity and magnetism as well as geometrical and physical optics. A good working knowledge of kinematics, vectors, and dynamics is assumed, as Physics 231 is a prerequisite for the course.

In addition to deepening your understanding of the concepts of physics, the course is designed to sharpen your problem-solving skills and to develop critical thinking skills. In the course, we will emphasize how a variety of phenomenon arise from a handful of fundamental principles. Students with a firm grasp of the material should be able to independently apply these fundamental principles to novel problems or situations. Quite often, physical concepts are expressed using the language of mathematics; as such, the two intimately linked. Though this course is by no means a math course (note: Math 231 is a corequisite), we will put mathematics to work to help us solve physical problems. As the course progresses, your working knowledge of the underlying mathematics should improve.

Lecture:
A daily schedule can be found later in this syllabus which shows reading assignments corresponding to each meeting day. The reading assignment should approximately correspond to the material covered in the lecture that day. Students should have those sections read **before** coming to the lecture so that they will be prepared for that day's material. Adjusting to the writing style used in physics texts takes some time and effort; however, with practice, you should be able to read and effectively digest the material. You will also be responsible for material found in specifically assigned textbook readings even if it is not discussed in lecture. Additionally, you will be responsible for material discussed in the lectures even if the material is not in the textbook.

Lecture notes will be uploaded to the website in advance of the lecture. You might find it useful to take notes directly on a printed copy of the notes. In this way, you can focus upon the content of the lecture rather than trying to madly copy every power point slide. The following is the direct link for the lecture notes:
http://www.pa.uky.edu/∼latimer/phy232s08/lectures/.

Recitation:
The recitation period is designed to develop your problem solving skills by applying the, sometimes abstract, principles discussed in lecture to concrete problems. By working through a large number of problems, the hope is that you will find a unified thread running through them all. With some individual practice, you should be able to independently solve novel problems using the strategies developed in lecture and recitation.

The recitation is an important component of the learning process as your instructor can focus upon concepts and applications which you may find difficult. The period is most useful if you have attempted the homework problems in advance of the meeting; in this way, your instructor can most effectively address any deficiencies. **Each recitation period will begin with a brief quiz based upon the weekly assignment**; this should provide you with additional motivation to work through your homework before meeting. You will be allowed to drop your two lowest quiz grades; as such, there will be no make-up quizzes for unexcused absences.

After the quiz, your recitation instructor will field questions and work out sample problems from the weekly assignment. For bookkeeping purposes, make sure to remember your recitation section number and your recitation instructors name.

Homework:
Every student must register with the WebAssign online homework service for the required weekly homework assignments. To gain access, you must either have a voucher for WebAssign bundled with some new textbooks or purchase WebAssign access by personal credit card at https://www.webassign.net/v4secure/.

To begin using WebAssign go to the login page https://www.webassign.net/login.html . For your WebAssign ID use your UK active directory user ID. For the institution enter uky in lowercase. and for the password enter phy232s08 in lowercase. After logging-in you should change your WebAssign password.

The weekly homework cycle is as follows. Each Friday the weekly homework assignment will be available on the WebAssign site. The problems will cover material on that Fridays class and next Monday and Wednesdays classes. At Thursday's recitation your recitation instructor will work out some problems from the assignment and answer your questions on the assignment. The deadline for completing the online homework is 5:00 pm on the Friday after the recitation.

The more practice you have in working various problems, the more you will come to understand the subject. Late homework assignments will **not** be accepted; however, you will be able to drop your lowest homework grade. **As the homework is graded electronically, the problems are largely numerical in nature. Despite this, it will be good practice for you to write out detailed step by step symbolic solutions to your homework problems as a practice guide for quizzes and tests.** Partial credit is given on the free response questions from your quizzes, midterms, and final. By writing out solutions in a logical step by step manner, you can earn more partial credit in the event that you make progress on a problem but, perhaps, fall short in achieving the final solution.

Exams:
The three fifty-minute examinations and two-hour final will require you to demonstrate an understanding of the concepts as well as problem-solving ability. The dates (and approximate coverage) are shown below. Tests will consist of multiple choice and free-response problems. Partial credit will be awarded in the event that you are making headway toward a correct answer but, perhaps, come up short.

The university policy on excused absences can be found in University Senate Rule 5.2.4.2. If you anticipate missing an exam (for example, if you are a member of a varsity athletic team which will be out of town on the day of the exam), provide me with a written request and supporting documents (such as provided by your team) at least one week in advance. Notify me as soon as possible after unexpected emergencies in your immediate family. If you are physically unable to take an exam due to illness, contact me by e-mail before or very soon after the exam, and be prepared to provide documentation (a contact phone number from a physician or a signed note from a university official). If you miss a exam without a valid excuse, you will receive a zero for the exam.

If you miss a single exam with an excused absence, you will be given either a make-up exam (which will not be less demanding than the exam missed), or, at my discretion, a calculated replacement grade to restore the points lost on the missed exam. In the latter case, your grade for the missing exam will be calculated from your ranking on the other two fifty-minute exams. If you miss the final examination or two fifty-minute exams, you may, at my discretion, get an I-grade only if you have a valid excuse and the average of your exam scores indicates a possibility of passing the course. You will have to complete the course at another time.

TEST 1: Monday, February 11 (Chs. 23, 24, 25).

TEST 2: Monday, March 3 (Chs. 26, 27, 28).

TEST 3: Monday, April 14 (Chs. 29, 30, 31, 32).

FINAL EXAM: **A** Wednesday, 30 April, 8:00 AM–10:00 AM (Cumulative).
B Thursday, 1 May, 8:00 AM–10:00 AM (Cumulative).

Grading Policy:

The course grade will be based mainly on the exams as seen below:

Three mid-term exams:	3×100
Final exam:	200
Homework (drop one):	100
Recitation quizzes (drop two):	100
Total:	700

An overall score of 90% or above will guarantee an A; 80% or above will guarantee a B; 70% or above will guarantee a C; 60% or above will guarantee a D; and below 60% could result in a failing grade. If deemed appropriate, these cutoffs may be reduced; however, they will never increase.

To succeed in this course, you must read the section assignments before each lectures classes and attempt the homework assignments before each recitation classes. Anticipate spending eight or more hours a week outside the classroom on reading and homework. Take an active role in the learning process ask questions to yourself and your class-mates. Talk with your recitation instructor, laboratory instructor, or lecturer if you dont understand something. When you read the textbook, identify the main concepts and their consequences; additionally, try to work through example problems without looking at the solutions. When you solve the problems, write down your solutions in a clear step-by-step manner.

Course evaluations

Course evaluations are an important component of our department's instructional program. An on-line course evaluation system was developed to allow each student ample time to evaluate each component of the course and instructor, thus providing the department with meaningful numerical scores and detailed commentary while minimizing the loss of instructional time in the classroom. The evaluation window for Spring 2008 will open on Monday, April 7, and close on Wednesday, April 23. To access the system during this time, simply go the Department of Physics Web page at www.pa.uky.edu and click on the link for Course Evaluations; then follow the instructions. You will need to use your student ID to log into the system, and this will also allow us to monitor who has filled out evaluations. However, when you log-in you will be assigned a random number that will keep all your comments and scores anonymous.

Resources

Help desk: Teaching assistants will answer physics questions at the physics help desk in the microcomputer laboratory (CP 148).

Your instructors: Feel free to talk with me or your course instructors on physics problems. All instructors have office hours (listed on the course website), or you can see them by appointment.

Chemistry-Physics Library: The library has many different introductory texts which could provide you with an alternate perspective on difficult topics.

Schedule:

The following calendar is a projection of which sections will be covered in the lecture. Revisions to the schedule will be made as needed.

DATE	TOPIC	READING ASSIGNMENT	HOMEWORK ASSIGNMENT
W Jan 9	Positive and negative charges, conducting and insulating materials, and charge conservation	23.1–2	
F Jan 11	Coulombs Law and superposition principle	23.3	
M Jan 14	The electric field and point charge assemblies	23.4	
W Jan 16	The electric field and continuous charge distributions	23.5	
F Jan 18	Field lines	23.6	HW1, 5pm
M Jan 21	MLK Jr. Day		
W Jan 23	Motion of charged particles under electric forces	23.7	
F Jan 25	Symmetry and geometry, electric flux and Gauss Law	24.1–2	HW2, 5pm
M Jan 28	Examples of Gauss law with charge distributions	24.3	
W Jan 30	Examples of Gauss law with electrical conductors	24.4–5	
F Feb 1	Energy and force, electric potential and electric field	25.1–2	HW3, 5pm
M Feb 4	Examples of calculating electric potentials and electric fields of charge distributions	25.3–5	
W Feb 6	Examples of calculating electric potentials and electric fields of charge distributions	25.3-5	
F Feb 8	Electrical conductors and electrical potentials	25.6	HW4, 5pm
M Feb 11	**Test1: Chs. 23, 24, 25**		
W Feb 13	Capacitors and charge storage	26.1–2	
F Feb 15	Examples of capacitors, networks of capacitors	26.2–3	HW5, 5pm
M Feb 18	Capacitors and energy storage	26.4	
W Feb 20	Capacitors and dielectric materials	26.5-7	
F Feb 22	Understanding of electrical currents, electrical resistance, and electrical power	27.1–3,6	HW6, 5pm
M Feb 24	Ohms Law and examples of simple circuits	28.1–2	
W Feb 27	Kirchoff s Rules and examples of complex circuits	28.3	

DATE	TOPIC	READING ASSIGNMENT	HOMEWORK ASSIGNMENT
F Feb 29	RC circuits and electrical instruments	28.4–5	HW7, 5pm
M Mar 3	**Test2: Chs. 26, 27, 28**		
W Mar 5	Magnetic forces, magnetic fields and moving charges	29.1	
F Mar 7	Magnetic forces, magnetic fields and current carriers	29.2–3	HW8, 5pm
M Mar 10	Spring break		
W Mar 12	Spring break		
F Mar 14	Spring break		
M Mar 17	Moving charged particles in magnetic fields	29.4–5	
W Mar 19	Biot-Savart law for magnetic fields and applications	30.1–2	
F Mar 21	Amperes law for magnetic fields and applications	30.3–4	HW9, 5pm
M Mar 24	More illustrations of Biot-Savarts and Amperes laws	30.1–4	
W Mar 26	Introduction to induction	30.5, 31.1	
F Mar 28	Examples of motional emfs	31.2–6	HW10, 5pm
M Mar 31	Examples of transformer emfs	31.2–6	
W Apr 2	Inductors	32.1	
F Apr 4	RL, LC circuits and electromagnetic energy	32.2–3,5	HW11, 5pm
M Apr 7	Maxwells equations and electromagnetic waves	31.7, 34.1–6	
W Apr 9	Maxwells equations and electromagnetic waves	31.7, 34.1–6	
F Apr 11	Reflection and refraction	35.1–6	HW12, 5pm
M Apr 14	**Test3: Chs. 29, 30, 31, 32**		
W Apr 16	Geometrical optics and mirrors	36.1-2	
F Apr 18	Geometrical optics and lens	36.3-4	HW13, 5pm
M Apr 21	Physical optics and interference	37.1–3,6	
W Apr 23	Physical optics and diffraction	38.1–3,4	
F Apr 25	Polarization	38.6	HW14, 5pm