

PHYS 212 Syllabus

Penn State University (University Park), Spring 2014

Overview

PHYS 212 (GN) GENERAL PHYSICS: ELECTRICITY AND MAGNETISM (4)

Calculus-based introduction to classical electricity and magnetism, including such topics as, electric charge and electric fields, Gauss's law, electric potential, capacitance, current, resistance, and circuits, magnetic fields, and fields due to currents, induction and inductance, magnetism of matter, Maxwell's equations, and electromagnetic oscillations.

Requirements

This course is a 4.0 credit course. You must be registered for BOTH the lecture (212) and the laboratory (212R). You cannot earn a grade if you are not registered for both courses.

Prerequisite: PHYS 211, MATH 140

Concurrent: MATH 141

Course Goals

Electricity and magnetism is the foundation of most technologies in our modern world: computers, cellular phones, television, and anything that uses electricity. PHYS 212 is an exploration of the discovery of electric and magnetism fields, the nature of these fields, and the deep connections between them. By the end of this course, you will be able to:

- use Maxwell's Equations to describe the structure, sources and behavior of electric and magnetic fields (including EM waves), and to calculate the fields present in a given situation.
- determine the forces and torques on charge and current distributions in electric & magnetic fields.
- relate the concept of electric potential to electric fields and apply the concept of electric potential to electric circuits.
- employ the concepts of resistance, capacitance and inductance, and be able to derive their values for different geometries.
- describe the nature of electric current and have a qualitative picture of what happens within an electric circuit when a current is present.
- describe and calculate the behavior of simple DC and AC circuits consisting of resistors, capacitors and inductors.
- identify technology that use these concepts and describe how these concepts work within that technology and how these technologies have affected our world.

The specific course content objectives are provided on Angel. These specific objectives will be of great help to you in preparing for exams since the objectives covered on each exam are explicitly stated and you can focus your preparations to master specific objectives.

Everything that is expected of you in this class will be covered in at least one of the reading, lecture, and laboratory. While you are responsible for everything in your reading, not everything covered in your reading will be discussed in class (lecture or laboratory). Lecture and laboratory will highlight the pivotal concepts and critical skills that you need to master the broader range of material covered in your reading. It is critical that you have completed your assigned reading *before* lecture and come to lecture prepared to think, work, and learn.

Course Materials

The text for this course is *Physics for Scientists and Engineers: A Strategic Approach* by Knight, 3rd edition. This course will cover Chapters 25–35. (This book is the 2nd Penn State custom edition.) The soft-cover PSU custom “split” with these sections, available at the bookstore, also contains access to the MasteringPhysics homework system we will be using in the course.

The regular problem set and reading assignments will be administered through MasteringPhysics, a web-based homework program. Access to MasteringPhysics is obtained by either purchasing the PSU custom book in the bookstore (the MasteringPhysics code is included) or or making a payment online (<http://pearsonmastering.com/>) . (The course ID is [vanhook48867](#)).

In addition you are also required to have an *i>clicker*. These are available from the bookstore and elsewhere. Using your *i>clicker* in lecture is part of your grade. You can find out about obtaining and registering *i>clickers* on the ITS Clicker website. There is a link in the PHYS 212L Angel page to directly register your clicker. If you do not register your clicker, then you cannot earn a lecture participation grade (5% of the total course grade).

Reading

All learning in this class begins with reading of the text. You will be given reading assignments for each lecture, and will be given homework questions covering this reading BEFORE you have discussed it in class. You are expected to come to classes, not necessarily with a full understanding of the material read but, at a minimum, prepared to discuss the contents of the reading and to identify difficult concepts and techniques.

Lectures

Lectures meet twice each week, on Tuesdays and Thursdays in 313 Osmond, from 9:45 am to 11 am. Lectures are designed to highlight pivotal concepts and critical skills and to give you opportunities to engage with these concepts in an active and meaningful way. You will be actively engaged during these sessions. Thus it is very important to come to class ready to think, work and learn. We expect you to come to class having done the assigned pre-class readings. These sessions are not a place for you to hear about something for the first time. They are a place to work through interactive learning components on topics you have already thought about.

i>clickers

We will use *i>clickers* in class for three different types of questions: (1) reading quizzes at the beginning of each class (graded for correctness), (2) in-class concept questions designed to challenge your thinking (graded for effort), and (3) review of material covered to make sure everyone understands what we just discussed (graded for effort). You can find out about obtaining and registering *i>clickers* on the ITS Clicker website (<http://clc.its.psu.edu/classrooms/resources/clickers/started/students>). When registering ***you must use your PSU Access ID (email address without the @psu.edu) to register your clicker in order to receive credit.*** If you register through the link in Angel (for PHYS 212L) it will automatically register you correctly.

“Clicker questions” are generally multiple choice conceptual questions are designed to help identify common misconceptions and provide feedback during the class. They are designed to help you know when you understand the topic at hand, and your instructor to know when more discussion is needed and when to move on to the next topic.

Each lecture you will earn points based on your answers to the beginning-of-class reading questions, the concept questions, and the review questions. The number of opportunities to earn points in this way is greater than the maximum number of points you can earn. For this reason, there will be no adjustments for forgetting to bring your clicker to lecture, and no extra-credit or make-up work for absences. If you fail to register your clicker in a timely manner, you will *not* get credit for lectures that occurred before you registered your clicker. If you get a new clicker during the semester, be sure to register it right away. To avoid accidentally swapping a clicker with another student, be sure to put your name or some other identifying feature on your clicker.

Because clickers will be used in lecture you must attend your scheduled 212L section. Appropriate use of clickers by their owner during their class is an expectation of the course. Asking someone to use your clicker for you is asking that person to help you cheat. If someone asks you to use their clicker, that person is asking you to help them cheat. If you agree, you have helped them cheat. If you observe someone is cheating - e.g., you see someone using two clickers - you are obligated to report it. If you do not, you are helping them to cheat. Please refer to the Academic Integrity Policy of this syllabus for more details.

Laboratories

Laboratory sections meet once a week in room 313 Osmond, on Thursdays from 12:20 pm to 2:15 pm. You must attend the laboratory section in which you are scheduled — no switching is permitted.

The laboratories are designed to provide you with hands-on experience with the material being investigated in class. Laboratory instructors lead the laboratory sessions and act as your guides as you explore the material. You will work collaboratively in three-member lab groups to carry out the experiments. The experiments are described via the 'labs' link on the course website.

Each three-member lab group has access to a Windows 7 workstation with both specialized physics software as well as standard word processing, data analysis, and

presentation software. The laboratory instructors are available to help students familiarize themselves with these programs. Help with MS Word and MS Excel can be found online at <http://its.psu.edu/training/>.

During the lab session, your group will prepare a single write-up, addressing specific points of the experiments. This write-up must be submitted by your group before the end of the laboratory session and all group members must be present when the report is submitted in person to the laboratory instructor.

Problem Sets (Online)

Regular problem set assignments are to be completed on the online system, MasteringPhysics. Answers to the problems are available immediately after the due date.

We will be using the online system MasteringPhysics (<http://pearsonmastering.com>) for regular problem sets [course ID: jin40017]. This system allows you to submit your work at any time of the day and night. Your grade on each assignment will be available immediately and, in most cases, you will have multiple tries to arrive at the correct answer. The entire process can be done from any computer with a connection to the Internet and a web browser. Pay careful attention to the supported browsers and required browser settings for the system.

The night before each lecture, there will be due a short *Reading Self-Check* assignment with a few questions that you should be able to answer based on the reading. Doing the reading and checking your understanding with these questions will ensure you are prepared for lecture the next morning. In addition, there will be a problem set due on Monday evenings (the Monday evening *Reading Self-Check* assignment will be incorporated in this assignment). The due date and time for each assignment appears on MasteringPhysics. Because answers to the problems are available immediately after the due date, no late assignments can be accepted. All the assignments for a given week will be combined into a single Problem Set grade in Angel.

Although the questions are asked and final answers to be provided online, it is crucial that you work through each problem completely with pencil and paper, as if you were going to hand in this work. This not only enables proper problem solving technique, it also eases collaboration. Students are encouraged to work together and collaborate on assignments. However, work submitted for individual assessment must be the work of the individual student. To be precise: discuss, don't copy. Please refer to the Academic Integrity Policy below.

Report any problems related to submitting your homework through the contact us link or by contacting the course administrator. Report any problems related to the physics content of your homework to your instructor.

Exams

There will be two midterm exams and a cumulative final exam. Exams will be closed book. Relevant physical constants and formulae will be provided. Calculators, cellular phones, smart phones, any other communication devices, tablet computers, and

organizers, and additional paper are not allowed. Room is provided for scratch work in the exam booklet.

The exams will be based on the assigned reading in the textbook, the material covered in lecture, the laboratories, and the homework assignments.

Please see the Course Content Objectives and the exams folder in Angel for more information about the exams in this course.

Conceptual Surveys

There is a pair of conceptual surveys at the start and end of the semester, covering the main conceptual material of the course. Although the pre-survey will not be graded for correctness, you must complete it with best effort to receive credit (1%). There are two parts to the post-survey grade: 1% for completing with best effort and, only if also took the pre-test, *up to 2%* extra credit (how much extra credit will be based on the post-survey score).

These content surveys will be held in the Penn State Testing Center. We have multiple time blocks on the days these quizzes will be taken, but you must register for specific times during those days during which you will take the quizzes. The Testing Center website (<http://testing.psu.edu/Students/>) has more information about procedures at the center.

Grades

Your grade in the course will be based on your lecture participation, performance in the laboratories, on the problem sets, on the post-survey, and on the exams with the following weights:

Lecture Participation (i.e., "Clickers")	5%
Laboratories	9%
Homework	9%
Midterm 1	23%
Midterm 2	23%
Final Exam	28%
Pre-Survey (effort)	1%
Post-Survey (effort)	1%
Post-Survey	<i>Up to 2% (extra credit)</i>

Final letter grades for the course will be based on an absolute scale. The course score will be calculated to the nearest integer. No curving of any kind will be employed unless the combined average exam score (computed as the combined average of all midterm and final exams taken to date) is less than 70%. In such cases, the grades on the most recent exam will be adjusted by additively raising the exam scores to allow the combined exam average to meet the target minimum of 70%. The post-survey score is not included in this process; nor will the post-survey score be curved. (Note that class averages in Angel are not reliable and are often less than the actual class average.)

Each student that completes the pre-survey will receive 1% towards his or her final class grade; each student that completes the post-survey will receive 1% towards his or her final class grade. Students that complete both surveys will be eligible for a 2% extra credit. Each student's performance on the post-survey will determine how much of the 2% he or she receives (performance on the pre-survey will not be used in calculating the extra credit).

The break points for the various grade levels are:

$93\% \leq A \leq 100\%$
$90\% \leq A- < 93\%$
$87\% \leq B+ < 90\%$
$83\% \leq B < 87\%$
$80\% \leq B- < 83\%$
$77\% \leq C+ < 80\%$
$70\% \leq C < 77\%$
$60\% \leq D < 70\%$
$0\% \leq F < 60\%$

You can access your scores for completed assignments on Angel via the Grades link. You are responsible for verifying all of your scores (with the exception of the final exam score) and reporting any discrepancies before the last lecture for the course.

Resources

For help on physics outside of class, you should attend the Physics Department *Learning Resource Center* or the office hours of any teaching assistant for the course, not just your own. The course lecturer also has office hours.

For help on technical issues, such as problems with grades, logging onto the laboratory computers, and the like, you should contact the course administrator directly or via Angel.

All information and course materials are posted on Angel in the PHYS 212 site. This includes:

- Course syllabus
- Reading assignments
- Laboratory activities
- Lecture notes
- Announcements
- Exam Information
- Contact information & office hours for the course instructors and staff
- Grade information

A few items are posted in the PHYS 212 site: the clicker registration, the TA evaluation at the end of the semester, and raw clicker scores at the beginning of the semester (so you can check that your clicker is registered and working properly).

Note to Students with Disabilities.

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at <http://equity.psu.edu/ods/>.

In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at <http://equity.psu.edu/ods/guidelines/documentation-guidelines>). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with the course administrator as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.

Academic Integrity

As described in *The Penn State Principles*, academic integrity is the basic guiding principle for all academic activity at Penn State University, allowing the pursuit of scholarly activity in an open, honest, and responsible manner. We expect that each student will practice integrity in regard to all academic assignments and will not tolerate or engage in acts of falsification, misrepresentation, or deception. To protect the fundamental ethical principles of the University community and the worth of work completed by others, we will record and report to the office of Judicial Affairs all instances of academic dishonesty.

The University and Departmental policy regarding academic integrity can be found on the course web page with links to the faculty senate policy: <http://www.psu.edu/ufs/policies/47-00.html#49-20>.

Excuse and Makeup Policy

Labs: The laboratory components of this course are structured around collaborative learning. You must be present in laboratory to do these assignments. If you are absent from a laboratory section with a valid excuse, as described under "Valid Excuse Policy", fill out and submit an excuse form and submit it to your TA. You will not be required to make up the missed activity (and it is not possible to make up a missed activity). Your score for the missed activity will be recorded as a zero until an excuse form is provided. If you are absent without a valid excuse, a score of zero will be recorded for that assignment.

Problem Sets: You must complete the problem sets (including reading self-checks) as scheduled, or provide a valid university excuse that justifies why the assignment could

not be completed in a timely manner given the length of time the assignment is available (in other words, an excuse for just the due date of the assignment is *not* sufficient).

Conceptual Surveys: You must take the pre- and post-surveys at the Testing Center. Any student that registers for the course after the first day of the semester should contact the course administrator within a week of adding the course to arrange to take the pre-survey. In the case of sudden or unexpected events that will cause them to miss one of the surveys, students are required to notify the course administrator prior to the date of the survey or as soon as is reasonably possible.

Examinations: All students should plan to take their exams at the scheduled times. Students can request makeup exams only by submitting a valid written excuse to the course administrator. In the case of sudden or unexpected events that will cause them to miss an exam, students are required to notify the course administrator prior to the exam or as soon as is reasonably possible.

Valid Excuse Policy

Valid reasons to be excused from an evaluative event (i.e. a graded class activity or a homework assignment) include illness or injury, family emergencies, university approved curricular and extracurricular activities, and religious holidays. If a student is unable to attend a scheduled activity or complete a homework assignment for one of these reasons and wishes to be excused from that activity or assignment, the student must print out an Excuse Form, fill out the requested information, and submit the form to the student's laboratory section instructor (depending on the activity missed). *The form must be submitted within one week of the missed activity* (in the case of an extended illness, within one week of the end of the illness).

Up to three (3) valid excuses will be accepted for a student throughout the entire course. More than three absences will interfere excessively with student learning. In extreme circumstances in which a student requires four or more absences to be excused, he or she must contact the course administrator directly to discuss the situation. Requests to be excused from a missed evaluative event due to reasons that are based on false claims is cheating and will be treated as described in the Academic Integrity Policy 49-20 <http://science.psu.edu/current-students/Integrity/Policy.html>.

A few comments regarding valid excuses:

- The student must provide all requested information on the Excuse Form and sign the form. Incorrect or missing information will result in the request for an excused absence to be denied.
- Family emergencies include a death in the immediate family, death of a close friend, sudden hospitalization of a close family member, and events of similar gravity. Students should inform their appropriate teaching assistants about the family emergency as soon as possible.
- To obtain an excuse for university-approved curricular and extra-curricular activities, a student needs to obtain a letter (or a class absence form) from the unit or department sponsoring the activity. The letter must indicate the anticipated

absence dates, and it must be presented to the student's teaching assistant at least one week prior to the first absence.

- In the case of religious holidays, students should notify their teaching assistants by the third week of the course of any potential conflicts.
- All excuses should be submitted to the relevant teaching assistants, not to the lecturing instructor. If there is a need to discuss the excuse with the course administrator, the teaching assistant should initiate this process.

Do NOT wait until the end of the semester to ask to be excused from activities that occurred earlier in the semester. You have one week from the time you return to class to submit an excuse; otherwise it will be denied.

Late Policy

Students arriving more than 10 minutes late for laboratory will not receive credit for that day's activities.

The laboratory is based on collaborative group activities. You will not obtain the full benefit of these activities and it is unfair to the other members of your group if you arrive late. Students arriving more than 10 minutes late will not be admitted and will lose credit for that day's class activities. If you have a valid excuse for arriving late you will be allowed to enter the class late only if you contact the TA in advance.