



Portland State University - Department of Physics

Physics 212 – General Physics Part II: Electricity & Magnetism

SYLLABUS – Winter 2007

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Office hours: **Tuesday and Thursday from 11.30-12.30 at SB2 314**
Text book: *Halliday / Resnick / Walker - 7th edition*, Wiley, ISBN: 0-470-103388 (includes **Wiley Plus Access**)

**Also: You can buy Wiley Plus with online textbook access at www.wileyplus.com
 YOU NEED to enroll in Wiley Plus online course here:**

<http://edugen.wiley.com/edugen/class/cls31162/>

Any questions, get help here: <http://www.wiley.com/college/studentfdoc>

Class: Monday and Wednesday, 4.40pm-6.30pm in **SB1 #107**

Web: <http://www.physics.pdx.edu/~bseipel/>

This course starts with the introduction of concepts related to just electricity: charge, electric field, electric potential energy, conservation of electric energy, etc. Notice that latter terms sound already very familiar to what you have learned in PH-211. Indeed, in PH-212 we will use those same concepts such as potential energy and conservation of energy, which were introduced in PH-211 when studying the gravitational force, the spring force, etc. You may also remember that for each (conservative) force we associate a corresponding potential energy. The nice surprise we have for you is that the only difference in PH-212 is that we will apply all those concepts to the particular case of the ELECTRICAL FORCE. So a great deal of your time will be devoted mainly to familiarize with the new terminology. The physics background is the same that you have already learned in PH-211.

Lecture Notes

[Lecture Notes 1](#) [Lecture Notes 2](#) [Lecture Notes 3](#) [Lecture Notes 4](#) [Lecture Notes 5](#)
[Lecture Notes 6](#) [Lecture Notes 7](#) [Lecture Notes 8](#) [Lecture Notes 9](#) [Lecture Notes 10](#)

Lectures (1-6)

01/08 Ch-21 Electromagnetism (electricity and magnetism).

Electric charge, charge conservation, conductors and insulators.

Interaction between charges: Coulomb's law

Practice problems Ch-21 (Q1, Q2, Q3, Q4, Q5, Q6, 2, 4, 8, 14, 15, 16, 18E, 23E, 25)

01/10 and 01/17 Ch-22 Electric Field (vector)

Electric field due to: a punctual charge, a line of charge, a charged disk.

Practice problems Ch-22 (Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, 7,8, 9, 10, 11, 12, 13, 16, 18, 19, 20, 23, 24, 25, 28, 33, 41, 43, 45, 46, 58, 62, 64, 66,68, 69, 73 83, 86)

01/22 and 01/24 Ch-23 Gauss' law. Calculation of electric fields established by charges distributed symmetrically. The derivation of Gauss' law involves a somewhat abstract mathematical concept (be prepared), but its use simplifies tremendously the calculation of electric fields.

Practice problems Ch-23 (Q1, Q3, Q4, Q5, Q7, Q8, Q10, 2, 5, 7, 8,10, 12, 14, 18, 20, 22, 23, 24, 26, 27,32, 33, 34, 35, 36, 39, 40, 42, 46, 47, 48, 49, 50, 58, 59, 72, 85)

01/29 Ch-24 Electric Potential Energy. Work done by electric forces. Electric force is a conservative force, therefore a potential energy function can be defined. Calculating the electric field (vector) from the electric potential (scalar).

Practice problems Ch-24 (Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, 1, 2, 3, 4, 6, 12, 13, 15, 16,16, 18,

20, 21, 22, 23, 24, 25, 26, 27, 28, 35, 37, 39, 40, 46, 48, 50, 51, 52, 53, 54, 55, 62, 64, 65, 70, 71, 74, 77, 80, 81, 83, 84, 86, 89, 96, 103, 115)

01/31 EXAM 1

Lectures (7-12)

02/05 Ch-25 Capacitance. Charge storage, electrical potential energy storage, Dielectrics

Practice problems Ch-25 (Q1, Q2, Q3, Q4, Q5, Q9, Q10, Q11, 1, 2, 3, 7, 10, 12, 15, 16, 17, 18, 15, 16, 18, 19, 20, 21, 22, 23, 25, 28, 31, 33, 35, 37, 39, 42, 43, 45, 47, 48, 52, 54, 55, 57, 59, 61, 63, 65, 67, 69, 70, 75, 78, 79, 80, 81, 82, 84)

02/07 and 02/12 Ch-25/26 Current, Resistance, Ohms' law

Practice problems Ch-26 (Q1-Q10, 1, 3, 4, 7, 9, 11, 17, 20, 21, 22, 23, 24, 25, 31, 33, 42, 46, 47, 50, 53, 69, 82, 83).

02/14 and 02/19 Ch-27/28 Circuits. Kirchoff's law, Magnetic field

Practice problems Ch-27 (Q1-Q11, 5, 6, 7, 8, 10, 13, 16, 18, 19, 22, 23, 26, 27, 30, 37, 38, 41, 42, 43, 48, 54, 69, 74, 77, 91)

02/21 Ch-28/29 Magnetic Field, Biot-Savart law: Calculation of magnetic fields due to arbitrary distribution of currents.

Practice problems Ch-28 (Q1-Q10, 2, 4, 7, 10, 11, 13, 15, 17, 24, 26, 34, 35, 39, 41, 45, 52, 54, 56, 58, 60, 67, 71, 74, 76, 82, 88,).

Ch-29 (Q1-Q10, 2, 4, 5, 6, 10, 11, 14, 20, 22, 24, 25, 28, 32, 33, 36, 50, 51)

2/26 EXAM 2

Lectures (13-17)

02/28 Ch-29 Biot-Savart law: Calculation of magnetic fields due to arbitrary distribution of currents. Force between two parallel currents. Ampere's Law: calculation of the magnetic field produced by a symmetric distribution of currents.

Practice problems Ch-29 (Q1-Q10, 2, 4, 5, 6, 10, 11, 14, 20, 22, 24, 25, 28, 32, 33, 36, 50, 51, 54, 56, 57, 58, 59, 60, 69, 76, 86, 91, 92).

03/05 and 03/07 Ch-30 and Ch-31 Faraday's Law of Induction. Lenz's law: a practical way to determine the direction of induced currents. Concept of inductance. Energy density contained in a magnetic field.

Practice problems Ch-30 (Q1-Q10, 2, 5, 9, 10, 11, 12, 15, 16, 18, 19, 22, 23, 24, 36, 40, 42, 44, 47, 52, 54, 57, 71, 72, 73, 76, 77, 79, 82, 83, 86, 87, 88, 92, 98, 99, 101, 108)

03/12 and 03/14 Ch-31/32 Electromagnetic Oscillations and Alternating Current, Maxwell Equations

Practice problems Ch-31 (Q1-Q11, 2, 5, 6, 7, 8, 9, 11, 13, 19, 21, 24, 28, 29, 30, 35, 38, 44, 49, 50, 51, 52, 56, 83)

Practice problems Ch-32 (Q1-Q11, 1, 2, 3, 4, 8-11, 12, 14, 16, 20, 21, 22, 23-27, 29, 30, 33, 34, 40, 50, 61, 65, 68, 70, 75)

03/19 EXAM 3

Quizzes

Besides the homework additional (online) quizzes will be given occasionally. These quizzes can consist of

both conceptual questions and problems and will be graded. The quizzes count are worth 30% of your final grade. **You have to subscribe in WileyPlus to do the quizzes. Please write me an email if you have questions**

Exams

The course grade is based on the quizzes (30%) three exams (70%). **The best exam of each student is worth 40%, and the two other are worth 35% (2nd best) and 25% of the total grade.** The exams can have both conceptual questions and problems. The exams are **non-comprehensive**, but exam 2 and 3 **may include** general concepts already covered in previous exam.

Exam1 Wednesday January 31th 2007 **4.40pm-6.30pm**

Exam2 Monday February 26th 2007 **4.40pm-6.30pm**

Exam3 Monday March 19th 2007 **5.30pm-7.20pm**

Make-up exams will be only given in case of emergencies or illness (with proof) at the end of the term.

One piece of paper is allowed with anything **YOU** want to write on it. Handwritten on both sides. Format: Letter 8.5" x 11"

Calculator is required!!

Grading Scale

>=90% A, 80%-89% B, 70%-79% C, 60%-69% D, < 59% F

Lowest in the range will be a MINUS, highest will be a PLUS

(E.g. 90% = A- and 89% = B+)

For a low scoring exam a curve might be applied

Tutoring

The Skills Enhancement and Tutoring Center (SETC) provides FREE drop in tutoring in Biology, Chemistry, Chinese, French, German, Spanish, Arabic, Russian, Psychology, Physics, Statistics, and Writing. It is a FREE resource available for PSU students sponsored by Student Services Resource Fees and Student Affairs. The SETC has trained undergraduate and graduate tutors and has flexible drop in tutoring hours. The SETC is located in Smith Memorial Student Union (SMSU) in room 425. More information can be found at www.setc.pdx.edu. (Physics: every day from 11:30 - 12:30)