Physics 212H Electromagnetism
Fall Semester 2015

Lecture: Tues/Thurs: 11:00 am - 12:15 pm, Jorgensen Hall 145
Recitation: Wed: 10:30 am -11:20 am; Jorgensen Hall 145
Instructor: Alexey Kovalev (Jorgensen Hall 310K, 472-2880, alexey.kovalev@unl.edu)
Office Hours: Wednesday 1 pm to 2 pm (JH 310K) or by appointment

Course Goals and Objectives:
Physics 212H is part of the calculus-based introductory physics sequence. This course focuses on the topics of electromagnetism involving phenomena such as electricity, magnetism, light and optics. We will emphasize developing both conceptual understanding and problem-solving skills for these topics and understanding how they fit into the broader picture of science.

Pre-requisites: Physics 211, or 211H, or permission.

Textbook (required)
SmartPhysics, Vol. 2, Electricity and Magnetism, Gladding, Selen, and Stelzer

BlackBoard, On-line SmartPhysics, and *i*>Clickers (Required)

BlackBoard: Class information including the syllabus, announcements, etc. will be posted on BlackBoard.

On-line SmartPhysics
In addition to the text book, you need to register on-line for SmartPhysics (www.smartphysics.com) and purchase the access code for this course separately from the website. Our Course access key is **(238b9ecb)**.
SmartPhysics includes the following components:

PreLectures and CheckPoints – Due Every Lecture Day
You are expected to go through the on-line Pre-Lecture and CheckPoint questions **before** coming to class. These materials will be available for a limited period of time only (normally due at 11:00 am on the day of lecture).

Homework – Due Every Week
There will be a weekly homework assignment on the on-line SmartPhysics website. The problems will usually be posted seven days before the assignment due date. You are encouraged to work with other Physics 212H students in figuring out how to solve the homework problems. But you should do all of the calculations yourself. The tentative due time is every Monday at 8 pm. There is a second due time, which is 7 days after the first due time, for 80% of the credit.

Daily Planner and Course Calendar
The above due times for prelecture materials and homework are tentative and may change based on course schedule. Please check the daily planner and course calendar in SmartPhysics for the assignments of the week. The due times may be changed without separate announcements.

***i*>Clickers:** We will be using clickers in every lecture. If you do not already have a clicker, please purchase a clicker at the University Bookstore and record your clicker number either at the Bookstore or via BlackBoard. For those who already have clickers, please register your clicker number on BlackBoard. Each student must have his or her own clicker. That will allow us to give you credit for your in-class responses.

Grading

I will use the following weightings in determining your grades:

Homework	10%
Pre-Lectures and CheckPoints	5%
Class and recitation participation	10%
In-class quizzes	5%
Two midterms (each 20%)	40%
Final Examination	30%

Course grades will be assigned according to the following point scale (total: 100 points):

100-95	A^+
94.9-90	A
89.9-85	A^-
84.9-80	B^+
79.9-75	B
74.9-70	B^-
69.9-65	C^+
64.9-60	C
59.9-55	C^-
54.9-50	D^+
49.9-45	D
44.9-40	D^-
less than 40 points	F

Tentative Class Schedule

Lecture	**Date**	**Topics**
1	Aug. 25	Introduction; Electric charges; Coulomb's law
2	Aug. 27	Electric field and forces; Superposition principle
3	Sep. 1	Electric flux and field lines
4	Sep. 3	Gauss's law
5	Sep. 8	Electric potential energy
6 (quiz)	Sep. 10	Electric potential
7	Sep. 15	Conductors and capacitance
8	Sep. 17	Capacitors
9	Sep. 22	Electric Currents
10	Sep. 24	Kirchhoff's Rules
First midterm	Sep. 29	
11	Sep. 29	RC Circuits
12	Oct. 1	Magnetism
13	Oct. 6	Forces and Torques on Currents
14	Oct. 8	Bio-Savart Law
15 (quiz)	Oct. 13	Ampere's Law
Fall break	Oct. 20	
16	Oct. 15	Motional Electromotive Force (EMF)
17	Oct. 22	Faraday's Law
18	Oct. 27	Induction and RL Circuits
19	Oct. 29	LC and RLC Circuits
Second midterm	Nov. 3	
20	Nov. 3	AC Circuits
21	Nov. 5	AC Circuits: Resonance and Power

22	Nov. 10	Displacement Current and Electromagnetic Waves
23	Nov. 12	Properties of Electromagnetic Waves
24 (quiz)	Nov. 17	Polarization
Thanksgiving	Nov. 27	
25	Nov. 19	Reflection and Refraction
26	Nov. 24	Lenses
27	Dec. 1	Mirrors
28	Dec. 3	Class review
Last week		Exam preparation

FINAL EXAMINATION: Mon. Dec. 14, 3:30 pm to 5:30 pm (JH 145)

ACE Certification for PHYS 212H

(i) the ACE Outcome(s) for which the course is certified

Student Learning Objective 4: Use scientific methods and knowledge of the natural and physical world to address problems through inquiry, interpretation, analysis, and the making of inferences from data, to determine whether conclusions or solutions are reasonable.

(ii) the opportunities the course will give students to acquire the knowledge or skills necessary to achieve the Learning Outcome(s)

The students will gave the opportunity to learn how to analyze physical systems through a combination of exposition, directed inquiry, and problem solving. The main focus of the course is on the appraisal of physical systems arrive at a thorough understanding of relationship between the system and its behavior. This process can be separated into four distinct phases. The first phase consists of an inquiry into what is the system and its essential components, what are the available data (which are given in the statement of the problem, or in diagrams, graphs, or reference tables, or some combination of these), and what are the key physical principles and laws governing the system. The second phase is to interpret the physical principles and laws and data in order to develop a plan – what inferences can be drawn from the data, what is the best way to approach the problem, that mathematical relations and methods are required, what intermediate information must be obtained -- and define goals for a solution. This plan is implemented in the third phase through detailed analysis, with careful attention to accurate execution of the mathematical relations representing the underlying physical principles. Critical evaluation of the reasonableness of the solutions and conclusions is the essential fourth and final phase of problem solving. This evaluation includes checking units, recalculating some quantities by a different route, and judging whether the magnitude of the answer is within reasonable physical limits.

(iii) the graded assignments which the instructor(s) will use to assess the student' achievement of the Outcome(s).

Student abilities for appraising physical situations is assessed in several ways. The course grade is based on a cumulative score that is derived from the following components, which are all graded and weighted according to the breakdown given in the syllabus. For each lecture assessment activities include student responses to (i) pre-lecture quizzes, (ii) Peer Instruction (PRS) questions posed during the lectures, and (iii) follow-up homework exercises and problems. For the weekly recitations students are assessed based on their performance in (iv) team problem-solving exercises, and (v) occasional quizzes. Progress in the course as a whole is assessed with (vi) midterm exams and (vii) a comprehensive final exam. The pre-lecture quizzes, PRS questions, and some of the homework exercises focus on specific knowledge, basic computational skills, and grasp of key concepts. The students' integrative understanding of physical principles and problem-solving is assessed with the more complex homework problems, recitation group problems, recitation quizzes, and the exams.

(iv) sampling of outcomes for purposes of curriculum review

The purpose of this review is to help faculty improve student learning outcomes. A small sampling of student work will be selected, identifying information removed, and archived for later review. Any students in ACE courses do not wish their work selected should notify their instructor.

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.