Physics 212
Spring Term 2023

Section 150, 9:30 am – 10:45 am, Tuesdays and Thursdays
Section 250, 11:00 am – 12:15 pm, Tuesdays and Thursdays

136 Jorgensen Hall

Lecturer: Prof. Alexei Gruverman, 081 Jorgensen Hall, Office phone: 402-472-4788
E-mail: agruverman2@ unl.edu
Help Hours: Tuesday, 2:30 pm – 3:00 pm; Thursday, 2:30 pm – 3:00 pm by appointment

This is a calculus-based course intended for engineering students or science majors (physics, chemistry, biology, premed). **Prerequisites: Physics 211 and Math 107**. Physics 212 is intended to cover basic electricity and magnetism.

Learning Objectives:
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.

Textbook:
Title*: University Physics,* 14th Edition, Volume II (which starts with Chapter 21)
Authors: Young and Freedman

Course Web Site: Both sections have their own websites on **Canvas**:

Section 150: **https://canvas.unl.edu/courses/149564**
Section 250: **https://canvas.unl.edu/courses/149572**

Make sure your e-mail address is current on the Canvas system, since it will be used to send out the important course-related announcements during the semester.

Exams:
There will be **three midterm exams** and a **comprehensive final**. All exams will be closed book exams and will be given in the same classroom where lectures are held. You will need an electronic calculator during the exams. There are no make-up or alternate exams outside the dates listed below. More details about the exams will be provided as they approach. Before each exam there will be a **quiz** held during the recitation (see below) on Friday of the week preceding the exam.

Exam Dates

Exam I	**February 21**, regular class time	JH 136
Exam II	**March 28**, regular class time	JH 136
Exam III	**April 18**, regular class time	JH 136
Final Exam	**May 15**, 6:00-8:00 pm	TBD

Lectures:
During lectures, to respond to concept questions, you will need to have an "ABCD" response card. The response card has to be printed out **in color** (a jpg file of the card is posted on the course web page under the "Files" tab).

Homework:
Weekly homework assignments will be done online using Mastering Physics, for which you must purchase an access code. Mastering Physics "Student Access Kits" come with new textbooks, they can be purchased separately at the bookstore, or they can be purchased through the Mastering Physics website (http://www.MasteringPhysics.com) which is reachable via the course website on Blackboard under the "Assignments" tab. To register for this course, use the class ID:

Section 150: gruverman39729 *(Course name* ***UNLPhys212Sec150AGSpring2023****)*
Section 250: gruverman37584 *(Course name* ***UNLPhys212Sec250AGSpring2023****)*

NOTE: **if you register for a wrong section, you may lose your points for the homework.**

Unless otherwise specified, homework assignments will be posted on Tuesday of each week and will be due by midnight **Saturday of the same week**. Follow the course web site for any changes to the homework schedule. Your weekly MP homework will constitute **10%** of your final grade.

Recitations:
Recitations will be held on **Fridays** (see table I below). You have to register to one of the recitation sections 15X or 25X. Transfers from one recitation section to another during the semester are not allowed. In the recitations, there will be a small number of quizzes as well as problems you will solve working in a small group. Your quiz results and group problem performance will determine your Recitation Score that will constitute **20%** of your semester grade. You will also have the opportunity to discuss (but not to work on) the Mastering Physics homework assignments.

Table I

#		Time	Day	Room	Instructor
151	RCT	11:30A-12:20P	F	JH 149	Yifei Hao
152	RCT	12:30-1:20P	F	JH 149	Yifei Hao
153	RCT	1:30-2:20P	F	JH 149	Yibo Wang
251	RCT	9:30-10:20A	F	JH 149	Bharat Giri
252	RCT	10:30-11:20A	F	JH 149	Bharat Giri

Course Grading:
Student abilities for mathematical problem-solving applied to physical situations will be assessed through (a) weekly homework exercises and problems (MasteringPhysics), (b) weekly recitations problems, (c) three midterm exams, and (d) a final exam. The course grade is based on a cumulative score that is derived from all these components (along with participation in PRS sessions during lectures) that are weighted according to the breakdown given below in Table II. **IMPORTANT NOTE: There will be no grade curving.**

Table II

25%	Final Exam
45%	Exams I, II, III (15% each)
20%	Recitation
10%	Mastering Physics Homework
100%	Total

Table III (Grading Scale):

A+	97-100%	**C+**	77-79.9%
A	93-96.9%	**C**	73-76.9%
A-	90-92.9%	**C-**	70-72.9%
B+	87-89.9%	**D+**	67-69.9%
B	83-86.9%	**D**	63-66.9%
B-	80-82.9%	**D-**	60-62.9%
		F	<60%

Attendance:
All students are expected to practice good attendance habits, which includes coming to class on time, calling in and personally notifying your instructor if you are going to be either absent or tardy, and **leaving class only after being dismissed**.

Learning Outcome:
The core skill of the course is the mathematical analysis of physical problems in order to connect their understanding of the relevant physical principles and laws pertaining to a physical system to the analytical and quantitative implications and logical outcomes. This is achieved through detailed analysis of a mathematical representation of the system or problem, drawing inferences from the problem's statement and context, structured by formal reasoning, and executed by analytical, computational means. The solutions' validity and reasonableness are evaluated by considering acceptable physical limits and performing simple checks testing.

Mathematics. The course makes use of mathematical analysis as an essential component of estimation, problem solving, and evaluation of solutions. The mathematical methods most used are algebra, trigonometry, vectors, calculus, unit analysis, and numerical computation.

Critical Thinking. The course emphasizes the development of mature appraisal and problem solving techniques, which involve critical thinking at three key stages. First, in problem analysis, identification of the essential physical principles and determining to which part of the system or process in the problem setting they apply. Second, in developing the solution, identification of useful and valid assumptions about how the system should behave, and relating this to the mathematical representation of the solution. Third, evaluation and testing the solution for reasonableness and accuracy.

Problem Solving. Problem solving is one of the main activities in the course. Therefore, most of the effort in the course is focused on the process and tools for solving problems involving physical systems.

Students with Disabilities:
Students with disabilities are encouraged to contact the lecturer, Prof. Alexei Gruverman, 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.

General Information:
See http://go.unl.edu/coursepolicies for information on University-Wide Course Policies and Resources.

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The following table lists the lecture dates, ***tentative*** lecture topics, and corresponding textbook chapters for the course. You will experience greater success in the course if you read the textbook chapters **BEFORE** listening to a lecture.

	Lecture Date	Lecture Topic	Textbook Chapter
1	January 24	Intro, Coulomb's Law	Chapter 21
2	January 26	Electric Fields	Chapter 21
3	January 31	Electric Fields	Chapter 21
4	February 2	Electric Fields	Chapter 21
5	February 7	Gauss' Law	Chapter 22
6	February 9	Gauss' Law	Chapter 22
7	February 14	Electric Potential	Chapter 23
	February 16	**Review for Exam I**	**Chapters 21-22**
	February 21	**Exam I**	**Chapters 21-22**
8	February 23	Electric Potential	Chapter 23
9	February 28	Capacitors	Chapter 24
10	March 2	Capacitors	Chapter 24
11	March 7	Current, Resistance	Chapter 25
12	March 9	DC Circuits	Chapter 26
	March 14	**No lecture**	**Spring break**
	March 16	**No lecture**	**Spring break**
13	March 21	Magnetic Fields	Chapter 27
	March 23	**Review for Exam II**	**Chapters 23-26**
	March 28	**Exam II**	**Chapters 23-26**
14	March 30	Magnetic Fields	Chapter 27
15	April 4	Biot-Savart law	Chapter 28
16	April 6	Ampere's Law	Chapter 28
17	April 11	Faraday's Law	Chapter 29
18	April 13	Faraday's law	Chapter 29
	April 18	**Exam III**	**Chapters 27-29**
19	April 20	Inductance	Chapter 30
20	April 25	RL, LC, RLC Circuits	Chapter 30
21	April 27	RL, LC, RLC Circuits	Chapter 30
22	May 2	AC Circuits	Chapter 31
23	May 4	AC Circuits	Chapter 31
24	May 9	AC Circuits	Chapter 31
	May 11	**Review for Final Exam**	**Chapters 21-31**
	May 15	**Final Exam**	**Chapters 21-31**