

# Electricity and Magnetism

## Physics 2220, Fall 2012

Lecture Section 001, Physics Room 102, Mo, We, Fr 12:00–12:50 p.m.

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**Professor:** Yuri Rostovtsev  
**Office:** General Academic Bldg., Room 525I  
**Telephone:** (940) 565-3281  
**E-mail:** [rost@unt.edu](mailto:rost@unt.edu)  
**Office Hours:** Mo, We, Fr 3:00–4:00 p.m., and by appointment

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**Text:** “*Physics for Scientists and Engineers*,” 8<sup>th</sup> Edition, by Raymond A. Serway and John W. Jewett, Brooks/Cole-Cengage Learning 2010. An optional Student’s Solutions Manual is also available. You will also need a Responsive Innovations Response Card, Part No. RCRF-01, distributed by Turning Technologies, LLC.

**Topics and General Information:** This course will cover electric fields, direct-current and alternating-current circuits, magnetic fields and magnetic induction, electric and magnetic properties of matter, electromagnetic waves, and geometrical and wave optics.

**Attendance and Participation:** You are expected to attend all lectures and recitations for the section in which you are enrolled; your grade will depend upon your attendance and participation in class. You will be expected to bring your Response Card with you to class, and participate in answering in-class questions.

**Exams:** There will be three exams during the semester, and a comprehensive final exam, to be given from 10:30 a.m. till 12:30 p.m. on Monday, December 10. Exam questions will be based on lecture material, and material contained in the text and homework assignments. You must show all of your work on your exam papers for full credit. Questions pertaining to the grading of exam questions and problems must be directed to the instructor in writing within two weeks after the exams are returned. There will be no makeup exams.

**Homework:** All homework will be posted via the internet. You must download your assignment, work the problems. Your neatly written solutions to all the homework problems must be put in the mailbox labeled “2220—Rostovtsev” near the south end of the 2<sup>nd</sup> floor hallway in the Physics Building by the due date. Selected homework problems will be discussed in recitation.

**Grade:** The grading in the course will be based on the total points earned from exams, homework, and lecture and recitation quizzes. The point values for each category are given below:

Exams	1 <sup>st</sup> exam: 125 points; 2 <sup>nd</sup> exam 150 points; 3 <sup>rd</sup> exam 175 points 250 points for the final*
Homework	100 points
Lecture & Recitation	100 points for lecture and 100 points for recitation quizzes
Bonus problems	_____
<b>Total</b>	<b>1000 points</b>

\*If your final exam grade is higher than your overall grade calculated by the method indicated above, your final exam grade will be used for your course grade.

**Lab Credit:** You must enroll separately in Physics 2240 for laboratory science credit.

*The University of North Texas is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 – The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.*

## Fall 2010, Physics 2220.001 Tentative Lecture Schedule

Date (week beginning Monday)	Chapter	Topic Started
August 27	Ch. 23	Coulomb's law, Electric fields
September 3	Ch. 24	Gauss's law
September 10	Ch. 25	Electric potential
September 17	Ch. 26	Capacitance, Capacitors in series and parallel
September 24	Ch. 27 Ch. 28	Current and resistance Direct electric current, EMF, Resistors in series and parallel— Kirchhoff's rules, RC circuits
October 1	<b>Exam 1—Chapters 23–28—Monday, Oct 1</b>	
	Ch. 29	Magnetic fields, Magnetic force, Charged particle motion in magnetic fields
October 8	Ch. 30	Sources of magnetic field, Biot-Savart law, Ampere's law, Solenoids, Magnetism in matter
October 15	Ch. 31	Faraday's law of induction, Lenz's law, Induced EMF
October 22	Ch. 32	Inductors, Energy in a magnetic field, RL circuits, Oscillation in an LC Circuit
October 29	Ch. 33	Alternating current circuits; Resistors, inductors, and capacitors in alternating current circuits, RLC series circuits, Power in AC circuits, Resonance in series RLC circuits
November 5	<b>Exam 2—Chapters 28–33—Monday, Nov 5,</b>	
	Ch. 34	Displacement Current, Maxwell's equations, Plane electromagnetic waves, Energy and momentum carried by E-M Waves
November 12	Ch. 35	Reflection and refraction
November 19	Ch. 36 Ch. 37	Geometric optics, Ray tracing, Mirrors and Lenses Interference of light, Double-slit experiment, Interference in thin films
November 26	Ch. 38	Diffraction, Polarization
December 3	<b>Exam 3—Chapters 33–38— Monday, Dec 3</b> Pre-finals Week—Catch-up and Review	

**FINAL EXAMINATION—Comprehensive—Monday, December 10, 10:30 a.m. – 12:30 p.m.**

## Physics 2220 Goals and Learning Strategies

The goals of instruction in Physics 2220 are to lead and to guide you to understand and master the fundamentals of elementary electromagnetism and optics, and to develop your skills of analysis using the mathematical tools of algebra and calculus. To help in achieving these goals you are requested to pursue the following strategies:

- (1) **Read the text chapter within the forty-eight hours prior to the class.** You should bring your questions to class or e-mail to the instructor prior to the morning of the class.
- (2) During class, **listen, observe, take notes, analyze, discuss with peers, answer questions, solve in-class problems and respond promptly via the ResponseCard™** technology as directed by your instructor.
- (3) **Review your textbook chapter summary and your notes** within twenty-four hours after class.
- (4) **Work the assigned problems** only after you have read and reviewed the material of the chapter.
- (5) **Respond via e-mail** or during office hours at [rost@unt.edu](mailto:rost@unt.edu) whenever you have an observation or question.
- (6) **Come to class prepared:** bring a calculator, your text book and, above all, your ResponseCard™ in order to participate and take full advantage of the lecture hall learning experience.

In this course we are using an Electronic Student Participation (ESP) system. After you have enrolled your hand-held keypad, you will be able to respond to questions, quizzes and polls that the instructor poses during the lecture and receive credit for participation, as well as immediate feedback and assessment of your understanding. ***Only when you participate via the keypad will you be credited with attending the class***, after the initial enrollment period. The motivation for this technology is an improved and more effectual learning environment. The procedure will be as follows:

- (1) You will see a PowerPoint™ slide presented that asks a question.
- (2) You will be given time to think about the question and select from several possibilities by pressing the letter or number on your keypad corresponding to your choice. Animation clues or timers will indicate when you should answer.
- (3) You will confirm that the system has accepted your input when your Participant ID number changes color on the screen.
- (4) Your answer will be recorded for the instructor to credit you with participation, and the overall results of the activity can be presented to the class in real time as programmed by the instructor.

### **To make your ResponseCard™ work in the lecture hall:**

- (1) You must provide the instructor with the six-character alpha-numeric code located on the back of your keypad, immediately underneath the bar code.
- (2) You must set the keypad channel to match that of the receiver in the lecture hall. Do so by depressing “GO” (causing the keypad LED to blink red-green) followed by “7” and “3.” At this point, if the LED is green, you are ready. If the LED continues to flash, press “GO” one more time, which should cause the LED to become green.

## Ancillary Materials

Blackboard Vista 4.2 will be used to post some useful course materials and your grades. To get to this resource, go to <http://ecampus.unt.edu> and follow the UNT link to log on. (You will log on using your UNT EUID and password.) Once logged on, select this course. You will find an electronic copy of this syllabus, copies of the Power Point presentations from lecture, copies of old exams with keys, the equation sheets for exams, and you will be able to access your exam and quiz grades. Please note that if you wish to communicate with the instructor via email, you will get a much faster response if you use [rost@unt.edu](mailto:rost@unt.edu) instead of the mail facility in Blackboard.

Also available for your extra problem-solving practice is a text similar to the one used for this class, with a full set of solutions for all of the problems in the backs of the chapters. These materials are on reserve in the [Science and Technology Library](#).

A Help Room (Physics Room 117) is staffed weekday afternoons by a teaching assistant to assist you with questions regarding any aspect of the course, including homework assignments. Hours will be posted on the door of the Help Room, as well as at the beginning of lecture. TA contact information will also be posted on the Help Room Door.

## Note to Members of TAMS

The Texas Academy of Mathematics and Science (TAMS) administration has made the followings statement and has asked us to include it in our syllabus for members of the Academy:

***Class attendance and participation is required. Students must be alert, attentive, energetic, and eager to learn. Students who exhibit disruptive behavior or show disrespect to a teacher in the classroom are subject to severe disciplinary sanctions. The Academy does not authorize absences from class. Students must report all absences to the Academic Office within 36 hours of the absence by completing a form in the Academic Office. A student will be assessed 5 disciplinary points for each class absence, unless the absence can be justified. Faculty will also be reporting absences to the Academic Office. A student will be assessed 15 disciplinary points for failure to report an absence that is reported by a faculty member.***

If you are a TAMS student and if you are absent for any reason, you are required to file an absence report with the TAMS Academic Office in Marquis Hall 134.