Electricity and Magnetism
Physics 2220
Spring 2015

Lecture Section 003, Physics Room 102, MoWeFr 11:00AM - 11:50AM

Recitation Section-203	*Mon./Weds.*	*3-3:50 p.m.*	*Phys 112,*	*TA instructor*
Recitation Section-208	*Fri.*	*2-3:50 p.m.*	*Peb 216,*	*TA instructor*
Recitation Section-209	*Mon./Weds.*	*2-2:50 p.m.*	*Phys 112,*	*TA instructor*

Professor: Yuankun Lin
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Telephone: (940) 565-4548
E-mail: yuankun.lin@unt.edu
Office Hours: MoWeFr 10:00 –10:50 am and by appointment

Text: Recommended text is *University Physics*, 13th Edition, by Young and Freedman. Students are required to obtain access to MasteringPhysics from Pearson, and to obtain a Responsive Innovations Response Card, Part No. RCRF-01, distributed by Turning Technologies, LLC

- **Options with Young/Freedman textbook that include Mastering access:**
  - Hardcover text with MasteringPhysics access (UNT bookstore price: around $248)
  - 3-hole punched edition with MasteringPhysics access (UNT bookstore price: around $167)
  - MasteringPhysics access including e-book for Young/Freedman (UNT bookstore price: around $133)

Other calculus-based physics texts are acceptable; **the successful student will have a textbook.**

Topics: 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/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. Cell phones must be off or in the airplane mode, at all times during class meetings. Inappropriate use (i.e. checking e-mail, checking social networks, researching for something unrelated to the class, etc.) of a smart phone, I-pad, etc, will not be tolerated; Laptop computers are not allowed to use in the class-room. **Students might be dropped from this course due to their non-attendance. Last day for instructors to drop a student for the non-attendance (WF) is: April 7, 2015 (Tuesday).**

Exams: There will be three 90-minute exams during the semester, to be given starting at 4:00 p.m. on Friday afternoons, and a comprehensive final exam, to be given at 4:00 p.m. on Monday, May 11. Exam questions will be based on lecture material, material contained in the text and in the 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. **If you have a scheduled course conflict with the exam times, contact your instructor about an alternate examination time. There will be no makeup exams.**

Homework: All homework will be posted, collected, and graded via the internet. You will also be required to keep a homework notebook with your written solutions, which will be collected weekly and graded. You must download your assignment each week, work the problems, and submit your solutions to the server by the due date indicated on the server. Your neatly written solutions to all the homework problems must put in the mailbox labeled "**2220 – Lin**" near the south end of the 2nd floor hallway in the Physics Building by the same due date and time as for the homework on the server. Details of accessing the homework server are given on the fifth page of this syllabus. Address all problems with the homework server to your teaching assistant. 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 attendance/short quizzes. The point values for each category are given below:

Exams	1st exam **11%**; 2nd exam **13%**; 3rd exam **16%**; **30%** for the final;
Homework	**15%**
Lecture & Recitation	**10%** for lecture participation, **5%** for recitation quizzes
Total	**100%**

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

Disability Accommodation: "The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact them by phone at 940.565.4323."
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.

UNT's policy on Academic Dishonesty can be found at: http://www.vpaa.unt.edu/academic-integrity.htm. Cheating, plagiarism or other forms of academic dishonesty on an exam or final will result in a grade of zero on the exam or final, and possibly an additional reduction in course letter grade. **In the examination room, all electronic devices except calculator must be off and put away (in your backpack). When you enter the room, place your backpacks in the front of the room and take pencils and calculators to your seat. No phone calculators are allowed.**

Spring 2015
Physics 2220.003
Tentative Lecture Schedule

Session	Date	Day	Chapter: Lecture Topic
1	21 Jan.	We	Ch. 21: Electric charges, fields and forces
2	23 Jan.	Fr	Ch. 21: PIC orientation; Coulomb's law, Electric field
3	26 Jan.	Mo	Ch. 21: Electric field, electric field lines **(*recitations start*)**
4	28 Jan.	We	Ch. 22: Electric flux, Gauss's law
5	30 Jan.	Fr	Ch. 22: Applications of Gauss's law
6	2 Feb.	Mo	Ch. 22: Conductors in electrostatic equilibrium
7	4 Feb.	We	Ch. 23: Electric potential energy, electric potential
8	6 Feb.	Fr	Ch. 23: Electric field from potential, Electric potential for continuous charge distributions
9	9 Feb.	Mo	Ch. 23: Equipotential surface
10	11 Feb.	We	Ch. 24: Capacitance, capacitor networks
11	13 Feb.	Fr	Ch. 24: Capacitor networks, energy in capacitors
12	16 Feb.	Mo	Ch. 24: Capacitors with dielectrics
13	18 Feb.	We	Ch. 24: Dielectric materials, electric dipoles
14	20 Feb.	Fr	Ch. 25: Ohm's law
XM1	**20 Feb.**		**Exam 1—Chs. 21-24: Friday, 4:00-5:30 p.m., GAB 105**
15	23 Feb.	Mo	Ch. 25: Resistors, electrical power in resistors
16	25 Feb.	We	Ch. 26: Resistor networks
17	27 Feb	Fr	Ch. 26: Kirchhoff's rules, RC circuits
18	2 Mar.	Mo	Ch. 26: RC circuits, household wiring, electrical safety
19	4 Mar.	We	Ch. 27: Magnets and magnetic fields
20	6 Mar.	Fr	Ch. 27: Magnetic force on charged particles and wires
21	9 Mar.	Mo	Ch. 27: Torque on current loops
22	11 Mar.	We	Ch. 27: Motion of charged particles in magnetic fields, Hall effect
23	13 Mar.	Fr	Ch. 28: Biot-Savart law, force between current-carrying conductors, Gauss's law for magnetism
—	16 Mar.	Mo	*No class – Spring Break*
—	18 Mar.	We	*No class – Spring Break*
—	20 Mar.	Fr	*No class – Spring Break*

24	23 Mar.	Mo	Ch. 28:	Ampere's law
25	25 Mar.	We	Ch. 29:	Faraday's law of induction
26	27 Mar.	Fr	Ch. 29:	Lenz's law

XM2 **27 Mar. Exam 2—Chs. 25-28: Friday, 4:00-5:30 p.m., GAB 105**

27	30 Mar.	Mo	Ch. 29:	Applications of Faraday's law
28	1 Apr.	We	Ch. 30:	Inductance, RL circuits, energy in magnetic field
29	3 Apr.	Fr	Ch. 30:	RL circuits
30	6 Apr.	Mo	Ch. 30:	LC and RLC circuits
31	8 Apr.	We	Ch. 31:	Phasors and Reactance
32	10 Apr.	Fr	Ch. 31:	Power in AC circuits and transformers
33	13 Apr.	Mo	Ch. 31:	Tansformers, electromagnetic radiation, properties of EM waves,
34	15 Apr.	We	Ch. 32:	Maxwell's equations
35	17 Apr.	Fr	Ch. 32:	Maxwell's equations and EM spectrum
36	20 Apr.	Mo	Ch. 32:	Poynting vector, energy and momentum in EM waves (skip section 32.5)
37	22 Apr.	We	Ch. 33:	Reflection, Refraction
38	24 Apr.	Fr	Ch. 33:	Dispersion

XM3 **24 Apr. Exam 3—Chs. 29-32: Friday, 4:00-5:30 p.m., GAB 105**

39	27 Apr.	Mo	Ch. 33:	Polarization, scattering and Huygens's Principle
40	29 Apr.	We	Ch. 34:	Image formation by surfaces
41	1 May	Fr	Ch. 34:	Image formation by surfaces, lens (skip sections 34.5-34.8)
42	4 May	Mo	Ch. 35:	Interference and two-source interference
43	6 May	We	Ch. 35:	Interference patterns and **Review**

FINAL **11 May Final Exam—Comprehensive: Monday, 4:00 p.m. - 6:00 p.m., Location: TBD**

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 yuankun.lin@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.
(7) **Work extra practice problems,** such as from the end-of-chapter problems in the text**.**

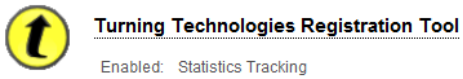
In this course we are using an Electronic Student Participation system. After you have given the instructor your hand-held keypad identification number, you will be able to respond to questions, quizzes and polls that the instructor poses during the lecture and receive credit for participation, as well as immediate feedback and assessment of your understanding. 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 depressing the letter or number on your keypad corresponding to your choice.

(3) 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 register your ResponseCard ™ in learn.unt.edu

(a) Login learn.unt.edu
(b) Select course PHYS2220
(c) Click "**course content**"
(d) Click



(e) Click "**Register ResponseCard Device ID**"
And enter six-character serial number located on the back of your keypad, immediately underneath the bar code as shown in the figure. The code don't contain "o" (it is zero).

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" (lower left button), causing the keypad LED to blink red-green, and then press "3" 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.

Note: If your card does not respond at all, the most likely problem is that the batteries have failed. Please have it checked in the Physics Instructional Center (PIC) in Room 209 of the Physics Building.

Homework Information

In this course you will be using MasteringPhysics®, an online tutorial and homework program.

What You Need:

- ✓ **A valid email address**
- ✓ **A student access code** (Comes in the Student Access Kit that may have been packaged with your new textbook or you can purchase access online at www.masteringphysics.com.)
- ✓ The ZIP code for your school: ***76203***
- ✓ A Course ID: ***UNTPHYS2220LIN2015***

Register

- Go to www.masteringphysics.com and click **New Students** under **Register**.
- To register using the Student Access Code inside the MasteringPhysics Student Access Kit, select **Yes, I have an access code**. Click **Continue**.

  –OR– ***Purchase access online*:** Select **No, I need to purchase access online now**. You will be asked to select your textbook—choose **Young/Freedman *University Physics 13e***, but you ***don't*** need to purchase the e-book. Click **Continue**. Follow the on-screen instructions to purchase access using a credit card. The purchase path includes registration, but the process may differ slightly from the steps printed here.
- **License Agreement and Privacy Policy:** Click **I Accept** to indicate that you have read and agree to the license agreement and privacy policy.
- Select the appropriate option under "Do you have a Pearson Education account?" and supply the requested information. Upon completion, the **Confirmation & Summary** page confirms your registration. This information will also be emailed to you for your records. You can either click **Log In Now** or return to www.masteringphysics.com later.

Log In

- Go to www.masteringphysics.com.
- Enter your Login Name and Password and click **Log In**.

Enroll in Your Instructor's Course and/or Access the Self-Study Area

Upon first login, you'll be prompted to do one or more of the following:

- **Join your MasteringPhysics course** by entering the **Course ID** provided by your instructor**.**

Note: This document is for informational purposes only and is subject to change upon notification.

- Enter the **ResponseCard™ ID (six-character alpha-numeric code)**, if prompted. Your instructor *may* provide specific instructions on what to enter. If so, be sure to enter this information EXACTLY as instructed.

Click **Save** and **OK**.

Congratulations! You have completed registration and have enrolled in your instructor's MasteringPhysics course. To access your course from now on, simply go to www.masteringphysics.com, enter your Login Name and Password, and click **Log In**. If your instructor has created assignments, you can access them in the **Assignments Due Soon** area or by clicking **View All** in this area. Otherwise, click on **Study Area** to access self-study material.

Support

Access Customer Support at www.masteringphysics.com/support, where you will find:

- System Requirements
- Answers to Frequently Asked Questions
- Additional contact information for Customer Support, including Live Chat

Please note that some problems in any given assignment may not be for credit. You can identify which problems are for credit by looking at the point value immediately after the problem number. The problems assigned zero credit are for your extra practice if you choose to take advantage of them, which you are encouraged to do.

You will also be required to keep a homework notebook with your written solutions, which will be collected weekly and graded. Your neatly written solutions to all the homework problems must be turned in to the mailbox labeled "**2220 –Lin**" near the south end of the 2nd floor hallway in the Physics Building by the same due date and time as for the homework on the server. It is recommended that you use loose-leaf paper and just turn in one week's work at a time because of space restraints. Be sure to staple all your work together and **put your name on your papers.** Your graded work will be returned to you in the alphabetized column of open boxes labeled "**Physics 2220**" to the right of where homework is handed in. Every effort will be made to return graded homework to these boxes within one week of the due date. *It is recommended that you photocopy your work before handing it in.*

Selected homework problems will be discussed in recitation.

Homework grading policy:

a. The computer-generated score is to be the starting point for determining your grade.
b. If you have earned computer credit for a problem, you must show sufficient work in your written HW to retain that credit. For each such problem, the grader will verify that:
    i. there is an explanation of the problem's solution in your written work;
    ii. the solution presented is reasonable, i.e., essentially correct as shown;
    iii. there is sufficient detail in the explanation to allow someone to understand all the steps of the solution.

    If these three conditions are clearly not met, then you will receive reduced or no credit for the problem.
c. If you are unsuccessful in obtaining the correct numerical solution to a problem, but have done work that you believe to be conceptually correct, **indicate clearly on your written solutions that you would like the problem to be graded for partial credit**. These problems will be graded on the basis of the correctness of the work presented, and may be assigned up to 90% of full credit.

Ancillary Materials

Blackboard Learn will be used to post some useful course materials and your grades. To get to this resource, go to http://learn.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.

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** (location to be announced) 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.

Course Evaluation

NOTICE: SETE (Student Evaluation of Teaching Effectiveness):

Note: This document is for informational purposes only and is subject to change upon notification.

The Student Evaluation of Teaching Effectiveness (SETE) is a requirement for all organized classes at UNT. This short survey will be made available to you on-line at the end of the semester and will provide you with an opportunity to provide feedback to your course instructor. SETE is considered to be an important part of your participation in this class.

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.

Core course objectives: In this course, students focus on describing, explaining, and predicting natural phenomena using the scientific method. Strong emphasis is placed on student understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.

PHYS 2220 contributes the following core course learning objectives:

(1) **Critical thinking**

Students will gain the ability to use the knowledge of mathematics and the basic physical laws of nature to solve physics problems. This skill requires creative thinking and innovation to identify and apply appropriate models to analyze physical phenomena.

(2) **Effective communication**

Students will gain proficiency in communicating ideas effectively in graphical and written form through submission of written homework solutions, examinations, and lab reports; and in oral form through question-answer problem-solving recitation sessions, occasional in-class discussion of concepts and experiments, and in conducting laboratory experiments, where they work together in small groups.

(3) **Quantitative skills**

Students will interpret and analyze observable facts and data to understand physical systems, and will have extensive practice applying algebra, geometry, trigonometry, and differential and integral calculus in their analyses. In the laboratory exercises, students must measure, compile, organize and analyze numerical data and ultimately draw conclusions about their findings as part of the laboratory objectives.

(4) **Teamwork**

Students work in small teams to conduct laboratory experiments and interpret the results. Students will need to consider different points of view and work effectively with others to deliver a satisfactory report.

Detail Topics: 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:

- Calculate the electric field or potential of point charges and continuous charge distributions.
- Understand and apply Gauss's law.
- Calculate the magnetic field from continuous current distributions.
- Understand the meaning and application of the integral form of Maxwell's equations.
- Analyze simple DC circuits involving resistors, capacitors and inductors.
- Compute the time constants for RC, RL and RLC circuits.
- Trace rays through simple optical systems involving mirrors and lenses.

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