Course Information

PHYS 2326.121 Electromagnetism & Waves
Summer 2008

Professor Contact Information

Dr. Paul MacAlevey; (972) 883-4634; paulmac@utdallas.edu; office hours are at my office FO 2.708B from 2:15 - 3:15 pm Tuesday & Thursday (or by appointment). [My office is being moved to ECSN 2.222 in early June and will switch my office hours to this office as soon as is possible.] I intend to use the inbox on WebCT 6 with which to send e-mail. I expect you to check this inbox at least once-a-day. (If you need help with your UTD computer account, please call (972) 883-2911 or visit the helpdesk at JO 3.906.)

Teaching Assistant: Russell Stoneback (He is unsure about having an office in ECSN and suggests that he be contacted at rstoneba@utdallas.edu)

Supplemental Instructor: ??

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Pre-requisites: PHYS 2325 (Physics I) and MATH 2419 (Calculus I)

Co-requisite: PHYS 2126 (This Lab class is a separate course and begins on either May 27 [Tuesday] or 29 [Thursday].)

Required Textbooks and Materials

Our official textbook will be **"University Physics" (twelfth edition) by Young & Freedman (ISBN: 0-8053-8684-X). Make sure that there is a 'Student Access Kit' with your book (whether the book is new or used). It allows you free access to the homework website through which you will do your homework. Having it is at least as important as having the textbook.)**

Any mention of chapter or section numbers refer to this book. You will want at least volume 2 (on Electromagnetism and Optics) because this course will use the chapters on Electromagnetism. If you consider using other textbooks, then be aware that you will have to find the appropriate chapters, sections etc. in the book of your choice. Similar in style to **"University Physics" are;**

- "Fundamental of Physics" Halliday, Resnick & Walker
- "Physics for Scientists and Engineers" R. Serway and R. Beichner

Some people like this book;

- "Physics; a strategic approach" R. Knight. (His approach is different.)

I'm not requiring that you buy a particular textbook. **I do require that you use a textbook that you like**. The edition number is not that important. Feel free to borrow older editions from the library if you like them.

You must register for the homework Web Site; www.masteringphysics.com described below. (In the course of doing this, you will need to used the **ID for the class**. It is PAULMACALEVEY2326SUMMER2008. More instructions about registering for this site are given in a document that I have put on WebCT) Mastering Physics uses the software called "Flash". (More details are in the document about "registering for Mastering Physics on WebCT)

The last pages of this syllabus can be cut up & stapled together to make flash-cards. **You will need these in order to answer questions that I'll ask in class. Please have them ready for the class on Thursday**

You will need a **'scientific' calculator for exams**. Graphing calculators etc. are not allowed in exams. (In exams, you will also need a small ruler for drawing vectors etc).

Course Description

We will cover material in volume 2 of the textbook (on Electromagnetism and Optics).. Please don't expect me to walk you through all the Physics that I think you'll ever need. **For more details, please refer to my 'approach to teaching and learning' that is on WebCT.**

Be sure to read the sections that are mentioned in the syllabus before the lecture! 10% of your final grade depends on the results of reading quizzes!

Physics has the reputation as a 'hard' subject. It may not be difficult for the reasons that you expect. There will be plenty of facts, equations and techniques to be remembered but I don't think that these are what make the subject difficult. Physics does require you to think about what you are doing and why you are doing it. Some people refer to this as 'critical thinking' and its unfamiliarity may be the most difficult thing for all of us as we approach Physics. I encourage students to think deeply about their understanding of physical phenomena (rather than just remembering solutions to problems). I don't think that this is particularly easy but hope that you find it rewarding and hope that this class develops our ability to think carefully about things we want to understand. Please think about this if you decide to take this class. As soon as you decide to take the class, you take on responsibilities to this community of learners. Before census day passes (Wednesday June 4), make sure that my course is the version of Phys 2326 that you want to take. (Please refer to my 'approach to teaching and learning' document on WebCT.) Also remember that the course is squeezed into 10 weeks as opposed to the usual 15. Be careful to choose a number of courses that is possible given any other commitments that you might have.

Student Learning Objectives/Outcomes

- Students will calculate the force on a charged particle that is between the plates of a parallel-plate capacitor
- Students will use Coulomb's law to describe the effect of static charge on nearby substances
- Given a diagram of a 'slide wire' generator, students will use Faraday's and Lenz' laws to find the electromotive force generated.

Assignments & Academic Calendar

Read my "approach to teaching and learning" tonight. Also do the homework assignment called "Introduction to Mastering Physics" tonight. There is no credit for doing this assignment but it is set-up in order to show you how to use the site for entering homework answers. (It goes over subscripts, superscripts, mathematical constants and physical constants, introduces 'hints', serialized parts, randomized answers, buttons called 'Submit Answer', 'Submit Problem' and 'My Answers'. **Note each student is responsible for making sure they get credit for the homework they have done. Check by going to 'my scores' on Mastering Physics and make sure that your score has been recorded**. As a rule-of-thumb, use four significant figures) in your calculations and **round to three significant figures at the very end** of the calculation. (Young & Freedman discuss significant figures in section 1.5.) Many of the homework questions use random numbers and will differ from the numbers in the book and from numbers on other homework assignments. In general you have 10 attempts at each question. One percent is deducted for each incorrect answer (whether in the main part of a question or in a hint). **There is a bonus for not using hints and no penalty for using any hints that are in questions. Credit is offered for answering questions in the hints**. (The bottom line is that you should use hints if you get stuck. You can earn enough credit in hints to off-set losing the bonus for not using them. Please don't click the Tab called 'give up' because the solution isn't available. If you are really stuck then you need to talk to me or to the TA.) Note that credit for late assignments doesn't fall to zero just after the due date. Credit falls to 40% over the interval of two weeks. Do expect to spend more time on the MasteringPhysics questions than with printed questions; thinking about feed-back from the system and having several attempts takes time. The advantage is that you get lots of practice and ultimately gain a better understanding.

Some sections of the textbook are explicitly skipped (to allow us time to reach other material). These are 24.5 (Molecular Model of Induced Charge), 25.6 (Theory of Metallic Conductors), 28.8 (Magnetic Materials), 29.8 (Superconductivity). Chapter 30 (Inductance) is skipped entirely. **You are responsible for all other sections of the chapters mentioned in the tentative schedule below.** This holds even if I don't mention a particular item explicitly during a lecture. Again, the reading assignment is to be done before the date on which it is listed. Problems that are assigned will appear on Mastering Physics along with the date on which the assignment is due.

Class meets 12:30 a.m. to 2:45 pm in FN 2.212. **The following is a tentative schedule.** Any changes to it will be announced in class or on WebCT.

Date		Reading Assignment	Lecture Material
Tuesday May 27	1	First meeting. No reading assignment.	Introduction. I'm assuming that sections 1, 2 and 3 of chapter 21 are familiar and I'll begin with them
Thursday May 29	2	Chapter 21.4 – 21.7	Electric Field …
Tuesday June 3	3	none	… Electric Field
Thursday June 5	4	Chapter 23	Electric Potential
Tuesday June 10	5	none	More Electric Potential
Thursday June 12	6	Chapter 24	Capacitance & Dielectrics
Tuesday June 17	7	Chapter 25	Current, Resistance and EMF
Thursday June 19			**First Midterm Test** – chapters 21 to 24
Tuesday June 24	8	Chapter 26.1 to 26.3	D.C. Circuits
Thursday June 26	9	Chapter 26.4 to 26.5 Chapter 27.1,2,4 and 5	Current that isn't constant Magnetic Fields and Magnetic Forces
Tuesday July 1	10	Chapter 27.6, 27.7 and 27.9	Finish Magnetic Fields and Magnetic Forces
Thursday July 3	11	Chapter 28.1, 28.2	Sources of Magnetic Field…
Tuesday July 8	12	Chapter 28.3, 4 and 5	More Sources of Magnetic Field
Thursday July 10			**Second Midterm Test** –chapters 21 to 27
Tuesday July 15	13	Chapter 29.1 (Induction Experiments), 29.4 (motional emf) [We'll approach the 'slide-wire generator' of examples 29.4 to 29.7 differently. Ignore the paragraph that begins; "The direction of the induced emf…" and the following paragraphs],	Electromagnetic Induction …
Thursday July 17	14	29.2 (Chapter 27.3 says more about the definition of magnetic flux), 29.3 (Lenz's law), 29.6 (Eddy Current)	More Electromagnetic Induction…
Tuesday July 22	15	Chapter 29.5 (Non-Coulomb electric field)	More Electromagnetic Induction
Thursday July 24	16	Chapter 28.6, 28.7	Amperes Law (You can ignore comments about Gauss' Law for now)
Tuesday July 29	17	Chapter 29.7	Displacement Current in Ampere's Law
Thursday July 31	18	Chapter 32 (Work through the derivation of the Wave Equation when you read this chapter)	Electromagnetic Waves
Thursday Aug 7	19	Chapter 32	More Electromagnetic Waves
			Final Exam - Comprehensive (The University decides on the time for final exams. At present, the final is scheduled for 11:00 am. You should check http://www.utdallas.edu/student/registrar/finals/ just in case the exam time is changed. Inform the registrar about any conflicts with the times for other exams etc.)

If time allows, I'll include the following too; chapter 22 (Gauss' law), 24.6 (Gauss' Law in Dielectrics) and 27.3 (Gauss' Law for magnetism).

Grading Policy

Reading Quizzes	10%
Homework	20%
2 midterm Exams (20% each)	40%
Final Exam	25%
Intangibles	5%

"Intangibles" include completion of reading quizzes and quality of summaries. (More about summaries is on WebCT. They are not chapter-by-chapter summaries [as in the text] or lecture-by-lecture summaries.

A grade scale that I have used in a previous semester is as follows: If x is a numerical grade then,

$x \geq 90$; A+	$65 > x \geq 60$; C+
$90 > x \geq 85$; A	$60 > x \geq 55$; C
$85 > x \geq 80$; A-	$55 > x \geq 50$; C-
$80 > x \geq 75$; B+	$50 > x \geq 45$; D+
$75 > x \geq 70$; B	$45 > x \geq 40$; D
$70 > x \geq 65$; B-	$40 > x \geq 35$; D-
	$35 > x$; F

Course & Instructor Policies

I intend to include a brief (10 minute) reading quiz in many of the lectures. The reading quizzes do not ask for mastery of the material. They may ask about terminology used or the 'caution' paragraphs and 'test your understanding' questions. The schedule lists the sections of the text to be read in preparation for the reading quiz.

Seats are assigned for the reading quizzes & tests. Please write the number of your assigned seat below!!!!

My assigned seat for all reading quizzes & tests is _____

Reading quizzes cannot be made up and will be given at random times during the classes. **Students must be in their assigned seats for these quizzes**.

Exams can only be made up if I am given adequate written reasons as to why the absence occurred. (Remember that **one of the mid-terms is automatically dropped**.)

You should **plan to attend all class sessions**. To make the lecture more productive, you will need to have read the assigned sections beforehand. You will be in your assigned seat during every reading quiz. If you finish your quiz before other members of the class, please don't distract other members of the class by moving around, talking etc. However, after we all have finished the quiz, I

encourage everyone to move into the front rows so that you will be able to take part in class discussion.

In my teaching, I will rely on the fact that you can read the text even though we need to discuss some parts of it later.

I do not propose to give my lectures in the traditional mode in which Science lectures are given. I intend to,

- ❖ Include a reading quiz in many classes
- ❖ For every 'key point' that I want you to think about, there will be several steps,
  - o A mini-lecture on the topic (or sometimes I'll jump straight to the next step)
  - o Several questions are asked so that we can arrive at a better conceptual understanding
    - ▪ Each question will be projected for you
    - ▪ I'll pause for a minute to let you think about the question. (Think **silently**!)
    - ▪ I'll ask you to hold up the flash-card giving the answer that you think is best. (Remember that these answers are un-graded so **please participate!** (One of the cards is a … question mark.) The point is not to get you to guess at the correct answer but for you to think about the reasons leading to the answer that you choose. Flash-cards are at the back of this schedule.
    - ▪ I'll ask everyone to convince their neighbor of the correctness of their answer. That will take us another minute or two. (Remember that the forcefulness of the claim doesn't always correlate well with correctness!)
      After a couple of minutes of discussion, I'll ask you to hold up a flash card giving the answer that you now think is the best one. (This answer is not graded either.) [I'll skip this step if most of us have answered correctly the first time.]
    - ▪ I'll talk about the correct answer
- ❖ **After the lecture**, I expect you to re-read the sections that we have covered. **Work through the 'example problems'** (green highlights) and do the assignment (or parts of it). After a topic has been completed, I suggest that you make a brief summary for yourself. It will help you to study for exams.

I want to lecture in this way because;

- It works!
- It is not possible to present all material in detail
- This method has been shown to enhance students' conceptual understanding of the material.
  - o Your ability to solve problems becomes much more robust. You will be able to solve problems that you have not seen before
  - o You learn how to learn Physics

This method of doing things is known as Peer Instruction and has been shown by Physics Education Research to be quite effective for many kinds of students. **It depends heavily on your being prepared for the lecture**. You prepare by doing the reading assignments. The first reading quiz is at the

beginning of the next lecture.

I'll ask the TA for the course to do **recitation/problem solving sessions** outside class time. While these are not compulsory, they have been found to be very helpful in the past. (If a supplemental instructor (SI) is assigned to the course, then they may offer such sessions too. My advice is to be there!)

My lecture notes are not those that a student might take. (By the way, taking good notes is the student's responsibility. I don't provide outlines of my lectures [my lectures are rarely the same] but if you are looking for a summary then look at the end of each chapter!) If you miss a lecture and are looking for notes, I suggest that you get them from another member of the class. Careful attention should be paid to the course material as it is delivered. To help in this, please turn off all electronic devices that might distract you and others. Regular attendance at class sessions is expected.

You should **plan to attend all class sessions.** To make the lecture more productive, **you will need to have read the assigned sections beforehand**. You will be in your assigned seat during every reading quiz. If you finish your quiz before other members of the class, please don't distract other member of the class by talking etc. However, **after we all have finished the quiz, I encourage everyone to move into the front rows so that you will be able to take part in class discussion**.

I do not undertake to talk about all possible Physics that is related to all topics mentioned in my schedule. **I'm relying on the fact that you can read the text** even though we need to discuss some parts of it later.

Withdrawal from the course:

If a student is unable to complete the course in which he/she is registered, it is the student's responsibility to withdraw from the course by the appropriate date. (This date is given above.) The instructor cannot initiate this process. If the student stops attending class but does not officially withdraw, he/she will receive a grade based on their performance in the course. If you withdraw from the course, as a matter of courtesy please send me an e-mail saying that you have.

Be sure to read the relevant sections before the lecture! 10% of your final grade depends on the results of reading quizzes!

Students must be in their assigned seats and must have either a UTD student card or government ID with them for all tests.

All tests will be done with books closed. Scientific calculators are often needed for tests or exams and it is up to you to have one. You can bring a single $3" \times 5"$ index card to any of the tests (and can write on both sides of it). The card must have been prepared by the person using it and be written by hand. All other books, notes, backpacks, purses, electronic devices (other than a scientific calculator) are to be placed at the sides of the room during the exam.

Any (academic) questions concerning the grading of a test must be brought to my attention before the end of the next day on which we meet. After this time, no grade will be changed for any academic reason.

Any student INVOLVED in cheating will be reported to the Dean of Students. That Dean will decide on the penalty for a confirmed incident of cheating.

Withdrawal from the course:

If a student is unable to complete the course in which he/she is registered, it is the student's responsibility to withdraw from the course by the appropriate date. (This date is given above.) The instructor cannot initiate this process. If the student stops attending class but does not officially withdraw, he/she will receive a grade based on their performance in the course. If you withdraw from the course, as a matter of courtesy please send me an e-mail saying that you have.

Be sure to read the relevant sections before the lecture! 10% of your final grade depends on the results of reading quizzes!

Reading quizzes cannot be made up (except as noted below). They will be given at random intervals during classes. **Students must be in their assigned seats for these quizzes**. Exams can only be made up if I am given adequate written reasons as to why the absence occurred. Homework will appear on the Mastering Physics website along with a due date/time. Homework done on or before the time it is due will be graded out of 100% of the marks available. After this time, the credit falls (linearly) to 40% of the available points over a period of two weeks = 336 hours.

Students must be in their assigned seats and must have either a UTD student card or government ID with them for all tests.

All tests will be done with books closed. Scientific calculators are often needed for tests or exams and it is up to you to have one. **You can bring a single** $3" \times 5"$ **index card to any of the tests** (and can write on both sides of it). It must have been prepared by the person using it and be written by hand. All other books, notes, backpacks, purses, electronic devices (other than a scientific calculator) are to be placed at the sides of the room during the exam.

Any (academic) questions concerning the grading of a test must be brought to my attention before the end of the next day on which we meet. After this time, no grade will be changed for any academic reason.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:
The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.