

SYLLABUS

PHYSICS 2326.003 ELECTROMAGNETISM AND WAVES

Fall 2017

Class meeting: Tuesdays and Thursdays, 4:00 to 5:15 pm in SLC 1.102. The first class meeting is on Tuesday, August 22. The last class meeting is Wednesday, December 6.

Instructor: Dr. Russell Stoneback, PHA 1.103. Phone (972) 883-2816, rstoneba@utdallas.edu

Office Hours: Thursdays, 1:00-4:00 pm

Teaching Assts.: TBA

Recitations and TA office hours: See guide on eLearning

Recommended Text: **UNIVERSITY PHYSICS**, 14th Ed., v. II, electronic edition or combined edition by Young and Freedman. Other editions are generally OK. If uncertain, check with me. If not available to you already, be certain your text includes the student access kit in order to do on-line homework. You will need to register for Mastering Physics at www.masteringphysics.com so that you can access the homework web site for this class.

Mastering Physics is mandatory for the class. If not obtained with your text, registration online requires a credit card. The cost is \$68.98. You may want to consider purchasing Mastering Physics and the e-text for this course for \$115.95.

Objectives and Outcomes: The course is intended to develop a qualitative and quantitative picture as to how a few basic equations can explain electrical and magnetic phenomena as experienced in our scientific and daily life. Also, the course will describe how this knowledge will be put together to predict electromagnetic radiation. The outcome is to be able to apply this background and acquired problem solving techniques to problems related to the student's career choice in fields such as engineering or biomedicine. The measurement of the student's knowledge obtained from this course and his/her problem solving capability will be by the exams. Further details are below under Summary of Class Objectives.

Class Announcements: Class announcements, videos, homework solutions and corrections will be found on e-learning that is available on the UTD home page. Your UTD user NET ID and password will give you access to this. You are expected to check this site regularly.

Class Mechanics: The classroom format will be lecture, follow-up quizzes (without credit), demonstrations where possible, answering student questions and working problems.

Tutoring: UTD offers tutoring, free of charge, using peers that were successful in previous semesters. <http://www.utdallas.edu/studentsuccess/help-with-courses/peer-tutoring/>

Prerequisites: PHYS 2325 (Mechanics) and MATH 2419 (Calculus II) or MATH 2414 (Integral Calculus) or equivalent. Student must register for Physics Lab II, PHYS 2126 (No exceptions to these will be allowed without the instructor's and/or other advisor's permission.)

Exams: PLEASE READ CAREFULLY. All exams will be given in the UTD Testing Center <http://www.utdallas.edu/studentsuccess/testingcenter/>,

It is located in MC 1.401 in the basement of McDermott Library. There are three exams over the semester. The exams are entirely electronic. The exams are randomized in that while the level of material is the same, no student will have the same exam as another student. The questions will be either multiple choice or true-false. Both conceptual and quantitative questions will be given. A sheet of useful formulae will be included in the exam package. You will be allowed to bring a basic scientific calculator. The time period for each exam will be one hour and fifteen minutes. There will be a fixed window of five contiguous days in which the exam can be taken. There are no make-up exams. It is essential that you reserve your place in the exam center early. **To be certain of your reservation, it is imperative that you make it approximately 5 - 6 weeks prior to each exam start-date.** The link is

<http://www.utdallas.edu/studentsuccess/testing-center/>

If you wait until the last day of the window, there may not be any exam stations available to you.

The three semester exams are each scheduled over 3 contiguous days. **There will be no class on Sept. 21, Oct 26, or Dec 5.**

Exam test dates are:

Exam 1- September 18, 19, 20, 21, 22. You may register beginning 8/30/17. Exam start times are available from 8:30 am until 7:15pm each day.

Exam 2- October 23, 24, 25, 26, 27. You may register beginning 9/15/17. Exam start times are available from 8:30 am until 7:15 pm each day.

Exam 3- December 4, 5, 6, 7, 8. You may register beginning 10/1/17. Exam start times are from 8:30 am until 8:15 pm for each day.

You are responsible for verifying the hours of operation of the testing center. You must finish the exam before the testing center closes.

Exams will be CLOSED BOOK. It is expected that a student will have a basic scientific calculator and writing implements. *During exams, all books, notes, computers, programmable calculators, communicating calculators, smart-phones or equivalents, cell phones, as well as backpacks, purses, and watches etc. will not be brought into the Testing Center. A student will need to present his/her valid Comet card in order to take any exam.*

Your course grade will be based on the three semester exams, attendance, quizzes, and your homework grade. Each of the three semester exams count for 25% of your grade, for a total of 75%. **No make-up exams will be given.** Homework counts for 15% of your grade.

Attendance will be taken in class (starting Aug. 24th) and counts for a maximum of 7% of your grade. Each class attended in Aug., Sept., Oct., or Nov., counts for 1%, with a maximum of 2% earned in a given month (only 1% for Aug).

3% of your grade is based on the survey quizzes described below.

Homework: Homework is graded and assignments will be made on-line in Mastering Physics. In order to do the homework, you must have access to the internet. The basic instructions are as follows:

- a. Log on to <www.masteringphysics.com>
 - b. Click on REGISTER using the ACCESS CODE in the student access kit that came with your text and follow on-screen instructions. The course ID is (EMSTONEBACKFALL17). Once you are registered, you will have access to your assignment package for the particular section being covered in class. **For your unique ID use the first 3 letters of your first name + the first 3 letters of your last name (Joe Smith -> joesmi). Make sure the name you give the website matches your name of record.**
 - c. You will have one week after assignment to complete it ending at just before midnight on the due day.
 - d. After the assignment is no longer available, the solutions to the appropriate problems in the text will be posted on e-learning. There is no makeup homework.
 - e. Homework counts for 15% of your final grade. Your homework average will be based on the total number of possible homework points with the following compensation: Allowing for missed assignments, at least 10% of the total possible homework points will be subtracted and your homework grade will be based on this lesser number of points.
- Homework will be assigned online. Solutions will be available on **e-learning** accessible on the UTD home page after the assignment is due. The assigned homework will provide a basis for portions of the exams. ***The student is expected to work out the homework on a regular basis and is responsible for obtaining the solutions.***

Grading: At the end of the semester each student will receive a numerical grade that reflects their weighted scores on exams and homework. Unless otherwise announced, no other factors enter into this numerical grade. Initial assignment of letter grades follows the usual break points (A = 90% and above, B = 80 to 89.9999%, C = 70 to 79.9999%, D = 60 to 69.9999%, F = less than 60%). While some flexibility may be applied in assigning break points, this should not be assumed.

Survey. You are asked to do two quizzes as part of your introductory physics course. The quizzes consist of multiple choice questions and are useful to the department in gathering information about the effectiveness of our courses. For merely taking both quizzes, a student will receive credit for 2% of his/her grade. If the student correctly answers $\frac{1}{2}$ or more of the problems on the 2nd of the survey quizzes, the student will receive an additional 1%. There will be no credit given for taking only one quiz. The protocol is described below:

These quizzes are on the eLearning site: “(MERGED) PHYS 1302 - PHYS 2326.all – (semester abbreviation)” for students in PHYS 1302 or PHYS 2326.

(These eLearning sites might have slightly different names depending on the display settings that are selected in eLearning.)

No pens or pencils are needed *and no books, notes, calculators or communications devices are allowed. Both quizzes must be taken in the Test Center at MC 1.401.* The Respondus Lockdown Browser must be used and is installed on the computers in the Test Center.

- The first quiz (pretest) will be available **from Tuesday September 5th to Tuesday September 19th provided that the Test Center is open.** Students need to reserve a seat in the Testing Center for this quiz at <http://www.utdallas.edu/studentsuccess/testingcenter/index.html>. (Instructions for reserving a seat in the Testing Center have been posted on this site.) The Testing Center's operational hours are at <http://www.utdallas.edu/studentsuccess/testingcenter/>. Tests are unavailable when the Test Center is not open or when the Test Center is fully reserved.
- The second quiz (posttest) will be available from **Friday November 3rd to Saturday Nov 18th provided that the Test Center is open.** Students need to reserve a seat in the Testing Center as for the pre-test. Tests are unavailable when the Test Center is not open or when the Test Center is fully reserved

A quiz will finish 1 hour after you click ‘Begin Assessment’. You must complete the quiz in a single interval of 1 hour or less. The first quiz is your chance to tell us what you already know about the topics in your physics class. Avoid guessing at answers.

PURPOSE OF THE COURSE

This course is devoted entirely to electricity and magnetism (and optics if time permits). We start from the basic concepts of electric charge and the force between them and then go on to develop the concepts of the electric field and electric potential. We learn about capacitance and energy storage in an electric field. At this point we allow charge to move from which we develop the notion of current and resistance. A current in turn intrinsically produces a magnetic field and we examine the force a magnetic field exerts on moving charges and learn how to relate a magnetic field to the current that produces it. Now we are in a position to describe the effects of time varying magnetic and electric fields. This leads us into Maxwell's Equations and electromagnetic waves.

The applications of this topic are fundamental to our society as it encompasses such matters as communication by electromagnetic radiation, functioning of our nervous system and operation of all electronic circuits.

MASTERING THE COURSE

There are some general principles that may prove helpful to you in mastering this course and, more generally, understanding what electricity and magnetism is all about and how it fits into the rest of science and technology.

First is the expectation that you come into the class with sufficient skill in mathematics. This includes algebra, geometry, trigonometry and basic integral and differential calculus.

Second it is assumed that you will work all the assigned problems, obtain solutions and seek help if clarification is needed. The assigned problems form a significant basis for exam problems.

Third and probably the most important principle is that you take all possible steps to master the **CONCEPTS** as they are presented in class and in the text. As we go through the course each new concept builds to some degree on the previous ones as well as concepts learned in Physics I (e.g.: work-energy, torque, vector and scalar products). Failure to master the concepts early in the course bodes poorly for what comes later. This Physics class is not for spectators! While working homework problems is essential, it is also imperative that you take time to understand the applicable concept or concepts, problem by problem. Since the exams are closed book, necessary formulas and constants will be given but these can be helpful only if you understand the concepts. To this end, the instructor and TA are here to help you master these concepts.

CLASSROOM PROCEDURE AND DECORUM

The format of the class is primarily a lecture. At the same time I welcome questions or interruptions for clarification and discussion at any time during the lecture. In fact, there may be periodic breaks in the lecture in order to have class discussion on particular points. Texting or the use of laptop computers during lecture time except for note taking is not permitted. While attendance is not generally mandatory, I believe it is important, particularly with regard to the quizzes and I expect that you will attend every class. *You are responsible for all material covered in class as well as material covered in the text and on e-learning unless explicitly excluded.* The class will start promptly at 4:00 pm and end at 5:15 pm.

Listed below are chapters to be covered:

- Chap. 21. Electric Charge and Electric Field
- Chap. 22. Gauss's Law
- Chap. 23. Electric Potential
- Chap. 24. Capacitance and Dielectrics
- Chap. 25. Current, Resistance and Electromotive force
- Chap. 26. Direct Current Circuits
- Chap. 27. Magnetic Field and Magnetic Forces
- Chap. 28. Sources of Magnetic Field
- Chap. 29. Electromagnetic Induction
- Chap. 30. Inductance
- Chap. 32. Electromagnetic Waves

- Chap. 31. Alternating Current (if time permits)
- Chap. 33. The Nature and Propagation of Light (if time permits)
- Chap. 34. Geometric Optics (if time permits)

SUMMARY OF CLASS OBJECTIVES

1. Students will be presented with a number of key concepts that lead to an understanding of Maxwell's Equations. The student is expected to demonstrate their understanding of these concepts on exams and quizzes.
2. Students will be able to apply each of the four Maxwell's equations to solve problems on exams and homework.
3. Students will be able to apply Maxwell's Equations to obtain the electromagnetic wave equation.

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 dean 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.

Off-Campus Instruction and Course Activities

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information

regarding these rules and regulations may be found at the website address given below.
Additional information is available from the office of the school dean.

(http://www.utdallas.edu/Business_Affairs/Travel_Risk_Activities.htm)

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