

Course Syllabus: PHYS2326.501 FALL 2016

Course Information

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| <i>Course Number/Section</i> | PHYSICS2326.501.16F |
| <i>Course Title</i> | Electromagnetism & Waves |
| <i>Term</i> | Fall 2016 |
| <i>Days & Times</i> | Tuesdays and Thursdays 5:30pm-6:45pm SLC 1.102 First class meeting August 23rd |

Professor Contact Information

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| <i>Instructor</i> | Dr Lindsay King |
| <i>Office Phone</i> | 972 883 6743 |
| <i>Email Address</i> | Lindsay.king@utdallas.edu |
| <i>Office Location</i> | PHY 1.910 |
| <i>TAs and their Office Hours:</i> | Fatemeh Khashami; Hoang Nguyen; Laxmi Risal; Natis Shafiq; (Christopher) Ian Timms, hours TBA |
| <i>Professor Office Hours</i> | Monday 9:30-10:30 |

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

Prerequisites: PHYS 2325 (Mechanics) and MATH 2419 (Calculus II) or MATH 2414 (Integral Calculus) or equivalent. Students 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. Familiarity with basic mathematics - including algebra, geometry, trigonometry and basic integral and differential calculus - is assumed.

Course Description

This course introduces the main concepts of electricity and magnetism, eventually showing how they are in fact facets of the same electromagnetic force, one of the four known fundamental forces of nature.

We start by considering static electric charges and the force between them, and then develop the concepts of electric field, electric potential energy and electric potential. The notion of capacitance, and of energy storage in an electric field is then considered. Then we allow charge to move, and introduce current and resistance. We also consider the motion of charged particles in electric and magnetic fields.

A moving electric charge, or an electric current, produces a magnetic field, and we see how these are related. Further, a time-varying magnetic field generates an electric current, and we examine how these are related too. We show how Maxwell's equations – some of the most important equations in physics – encapsulate the relationships between electric and magnetic fields, charges and currents, and we learn how electromagnetic waves originate and propagate.

Along the way, problems will be assigned or classroom examples will be presented that will demonstrate applications to physical systems. The physics that we will cover is fundamental to society, being at the heart of many biological processes and techniques used in medicine, and of numerous other fields such as engineering.

Student Learning Objectives/Outcomes

The primary objectives of the course are to gain an understanding of electromagnetism and its relevance to the real world, as well as to develop problem-solving skills. As a result of the course, the student is expected to demonstrate an understanding of the key concepts of electricity and magnetism - the laws, theories and relevant findings - and to be able to apply this knowledge to problems.

Topics include:

- Electric Charge
- Electric Force
- Electric Field
- Coulomb's Law
- Gauss's Law
- Electric Potential Energy
- Electric Potential
- Capacitance and Dielectrics
- Electric Current and Resistance
- Direct Current Circuits
- Magnetic Field and Magnetic Force
- Lorentz force law for charged particles
- Electromagnetic Induction
- Faraday's Law
- Lenz's Law
- Maxwell's Equations
- Electromagnetic Waves

Required Textbooks and Materials

There is no required textbook, but we will primarily follow UNIVERSITY PHYSICS, (preferably 13th Ed.; earlier versions are also fine) by Young and Freedman, publisher Pearson-Addison Wesley. If you are purchasing the book, make sure that it includes the student access kit in order to do online homework. If you already have the book and are not already registered, you will need to register at the URL www.masteringphysics.com so that you can access the homework web site for this class. If you do not purchase the textbook, you will need to purchase a key for mastering physics. Details of the homework site will be announced in class.

Note: you are responsible for taking notes during class, and any notes posted on eLearning are a supplement to your own.

Assignments & Academic Calendar

Class announcements will be sent out on eLearning 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, at least three times a week!

Homework assignments: Weekly homework assignments will start on Thursday of the second week of class, and are to be completed on www.masteringphysics.com. I will give instructions during class.

Exams: There will be three tests:

Exam I – TBD

Exam II – TBD

Final exam – TBD

All exams will be in assigned rooms.

It is expected that a student will have a basic scientific calculator and writing implements. When requested, all books, notes, computers, programmable calculators, PDAs, smartphones (e.g. Blackberry, iPhone), cell phones, as well as all bags (backpacks, purses, etc.) are to be placed at the sides or front of the room during an exam. A student must produce his/her valid student identification card, Texas Driver's License or other valid form of photo ID if requested, in order to take any exam.

Grading Policy

Your course grade will be based on three tests (75%), homework (15%) and quizzes/special homework/class participation (10%). For homework, some allowance will be made for missed assignments, one assignment being dropped.

A bonus of 2% will be added if you complete both of the quizzes as described on the final page. Initial assignment of letter grades will follow the usual break points.

Course Policies

The format of the class is primarily a lecture. Texting or the use of laptop computers during lectures, except for note taking, is not permitted since this can be very disruptive to other students! Attendance is very important and I expect that as far as possible you will attend every class. You are responsible for all material covered in class as well as supporting material unless explicitly excluded. The class will start promptly at 17:30 and end shortly before 18:45.

No make up exams will be given, but do speak with me if there are extenuating circumstances regarding absence for exams. You will be required to produce a medical note or other supporting documentation.

Lindsay King
20th August 2016

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to <http://provost.utdallas.edu/syllabus-policies> for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.

To Students (from Dr MacAlevey):

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.

These quizzes are on one of the following two eLearning sites: “(MERGED) PHYS 1301.701 -PHYS 2325.701-F16” or “(MERGED) PHYS 1302.701 - PHYS 2326.701 - F16”.

(These eLearning sites might have slightly different names depending on the display settings that are selected in eLearning.) The first site is for the mechanics classes (physics I) and the second is for the electromagnetism classes (physics II).

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 1.304.** The Respondus Lockdown Browser must be used and is installed on the computers in the Test Center.

1. The first quiz (pretest) will be available **from 8:30 on Tuesday Sept. 6th to 9:00 pm on Monday Sept. 19th**. You 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/>.
2. The second quiz (posttest) will be available **from 8:30 on Monday Nov 28th to 9:00 pm on Monday Dec. 12th**. You need to reserve a seat in the Testing Center as for the first quiz.

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.

Any credit for doing the test(s) will be decided by the instructor of your class.

The first quiz is your chance to tell us what you already know about the topics in your physics class. Avoid guessing at answers.

Take care,

Paul MacAlevey