

PHYS4310/PHYS5302/PHYS5370: EM Field Theory 1/Leveling EMT/Background EMT.

Text: Introduction of Electrodynamics, Fourth Edition, David J. Griffiths.

Office Hours: MW 9:00-10:00, MW 3:20-4:00 or by appointment.

Instructor: Dr. Ir. Wilhelmus J. Geerts

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Class room: RFM3223

Meeting time: MW 12:30-1:50

Course Description: An introduction to the electromagnetic field theory of classical physics for static fields. Topics included will be the electrostatic field, polarization and dielectrics, electrostatic energy, magnetic field of steady currents, magneto static energy, and magnetic properties of matter.

Objectives: This course is much more mathematical inclined than the sophomore Electricity and Magnetism course (PHYS2425). We will cover chapters 1 through 6 of the text (pages 1 through 295). By the end of the course you should be able to demonstrate the following:

1. Good understanding the geometrical interpretation of the gradient of scalar fields and the divergence, and the curl of vector fields.
2. Proficiency in using scalar line integrals of vectors, scalar surface integrals of vectors, and volume integrals of both vectors and scalars to solve problems and perform calculations related to static electric and/or magnetic fields.
3. Proficiency in using mathematical vector tools to solve problems and perform calculations related to static electric and/or magnetic fields.
4. Familiarity with Poisson's and Laplace's equations and be able to use them to solve electrostatic problems in vacuum or in materials.
5. Good understanding of the microscopic theory of dielectric materials.
6. Good understanding of the microscopic theory of magnetic materials, including diamagnetic, paramagnetic, and ferromagnetic materials.
7. Good understanding of the method of images and being able to apply this technique on a variety of electrostatic and magneto-static problems.
8. Have a good understanding of the boundary conditions in electrostatics and magnetostatics and apply them to solve problems.
9. Be able to solve non-symmetrical EMT problems using the differential equation solver Comsol MultiPhysics.

Prerequisite: MATH3323, MATH3373, and PHYS3320, all with a C or higher. Students that got below a D in PHYS2425 are encouraged to retake PHYS2425 before taking PHYS4310.

Withdrawal: You may withdraw from the course and receive an automatic W until October 25, 2015, 11:59 pm. Withdrawal from the university (this means all you classes) can be done until November 19, 5:00 PM.

Homework: Homework is due every Monday at the start of class. Late homework cannot be accepted once the solutions are distributed. I will drop your lowest score. Homework is important for developing an understanding of Electricity and Magnetism. Homework will take a considerable amount of time and effort. I highly recommend you to form a study group or find a partner when working on the homework. Start the homework by yourself, then work with a group, and finally, finish up on your own.

Reading: I expect you to read the text before class. The lecture will clarify your understanding and help you digest the material but is no supplement to reading and studying the text.

Grades: Grades for the course will be determined as follows:

Homework	25%
Semester Exams and Final	70%
Class work	5%

PHYS5370: Students enrolled in Physics 5370 need to do additional assignments.

Honor Code Texas State University

As members of a community dedicated to learning, inquiry, and creation, the students, faculty, and administration of our University live by the principles in this Honor Code. These principles require all members of this community to be conscientious, respectful, and honest.

WE ARE CONSCIENTIOUS. We complete our work on time and make every effort to do it right. We come to class and meetings prepared and are willing to demonstrate it. We hold ourselves to doing what is required, embrace rigor, and shun mediocrity, special requests, and excuses.

WE ARE RESPECTFUL. We act civilly toward one another, and we cooperate with each other. We will strive to create an environment in which people respect and listen to one another, speaking when appropriate, and permitting other people to participate and express their views.

WE ARE HONEST. We do our own work and are honest with one another in all matters. We understand how various acts of dishonesty, like plagiarizing, falsifying data, and giving or receiving assistance to which one is not entitled, conflict as much with academic achievement as with the values of honesty and integrity.

THE PLEDGE FOR STUDENTS: Students at our University recognize that, to insure honest conduct, more is needed than an expectation of academic honesty, and we therefore adopt the practice of affixing the following pledge of honesty to the work we submit for evaluation:
I pledge to uphold the principles of honesty and responsibility at our University.

THE PLEDGE FOR FACULTY AND ADMINISTRATION: Faculty at our University recognize that the students have rights when accused of academic dishonesty and will inform the

accused of their rights of appeal laid out in the student handbook and inform them of the process that will take place. I recognize students' rights and pledge to uphold the principles of honesty and responsibility at our University.

ADDRESSING ACTS OF DISHONESTY

Students accused of dishonest conduct may have their cases heard by the faculty member. The student may also appeal the faculty member's decision to the Honor Code Council. Students and faculty will have the option of having an advocate present to insure their rights. Possible actions that may be taken range from exoneration to expulsion.

Preliminary Schedule PHYS 4310/PHYS5302: Electromagnetic Field Theory 1.

Monday 8-24-2015	Ch1: Vector Analysis
Wednesday 8-26-2015	Ch1: Vector Analysis
Monday 8-31-2015	Ch1: Vector Analysis
Wednesday 9-2-2015	Ch2: Electrostatics
Monday 9-7-2015	Labor Day
Wednesday 9-19-2015	Ch2: Electrostatics
Monday 9-14-2015	Ch2: Electrostatics
Wednesday 9-16-2015	Review
Monday 9-21-2015	Semester Exam 1
Wednesday 9-23-2015	Ch3: Special Techniques
Monday 9-28-2015	Ch3: Special Techniques
Wednesday 9-30-2015	Ch3: Special Techniques
Monday 10-5-2015	Ch4: Electric Fields in Matter
Wednesday 10-7-2015	Ch4: Electric Fields in Matter
Monday 10-12-2015	Ch4: Electric Fields in Matter
Wednesday 10-14-2015	Review
Monday 10-19-2015	Semester Exam 2
Wednesday 10-21-2015	Comsol MultiPhysics
October 25, 11:59 PM	Automatic W deadline
Monday 10-26-3015	Ch5: Magnetostatics
Wednesday 10-28-2015	Ch5: Magnetostatics
Monday 11-2-2015	Ch5: Magnetostatics
Wednesday 11-4-2015	Comsol MultiPhysics
Monday 11-9-2015	Ch6: Magnetic Fields in Matter
Wednesday 11-11-2015	Ch6: Magnetic Fields in Matter
Monday 11-16-2015	Ch6: Magnetic Fields in Matter
Wednesday 11-18-2015	Review
November 19, 5:00 PM	Withdrawal of the University
Monday 11-23-2015	Semester Exam 3
Wednesday 11-25-2015	Thanksgiving
Monday 11-30-2015	Comsol MultiPhysics
Wednesday 12-2-2015	Comsol MultiPhysics
Thursday 12-3-2015	Last day of the Semester
Wednesday 12-9-2015	Final Comprehensive Exam 11:00-1:30

