MayTerm 2023

Syllabus for “Introductory Electricity and Magnetism ”

PHYS 1304

INTRO E&M DR. D BALAKISHIYEVA

Textbooks

Primary textbook: Fundamentals of Physics Halliday, David, Robert Resnick, and Jearl Walker. 12th edition New York: John Wiley & Sons.

Alternate textbook 1 (self learning, not for homework submission): Knight, Randall D. *Physics for Scientists & Engineers: A Strategic Approach with Modern Physics*. Boston, MA: Addison-Wesley.

Alternate textbook 2 (self learning, not for homework submission): Serway, Raymond A., and John W. Jewett, Jr. *Physics for Scientists and Engineers with Physics Now and InfoTrac*. New York: Brooks/Cole.

Class meetings

Class will meet in person every week day from 10 am till 3 pm. This includes 1 hr lunch break. Tentative lunch time is 12 pm (this time can change upon request from students). There will be 1 hr office hour every day after the classes, at 3 pm. Extra office hours may be scheduled upon individual requests.

There will be no zoom streaming

Course description

Introductory Electricity and Magnetism is a calculus-based college- level physics course for pre-engineering and would-be science majors. Prerequisite course: **MATH1337**

Students will be expected to familiarize themselves with the material scheduled for each of the days prior to the class (see Syllabus attached on Canvas). To help to prepare, powerpoint slides will be posted on Canvas.

Students finishing this course should have a strong conceptual understanding of physics and well-developed skills in performing and analyzing laboratory activities. This course utilizes guided inquiry and student-centered learning to foster the development of critical thinking skills.

Benefits of taking this course

1. Quickly acquire UC tags and satisfy your major's requirements

2. Retake to improve your grade

3. Gain transferable skills in problem solving

4. Take advantage of Jan term's small class sizes

Disability Accommodations

Students needing academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit http://www.smu.edu/Provost/ ALEC/DASS to begin the process. Once registered, students should then schedule an appointment with the professor as early in the semester as possible, present a DASS Accommodation Letter, and make appropriate arrangements. Please note that accommodations are not retroactive and require advance notice to implement.

Accommodations for an extended time test need to be made in advance with DASS for all tests. If you chose to take the test in class with the rest of the students, your test will be collected at the same time as others. **You are urged to make extended time arrangements in advance with DASS.** Our schedule makes it impossible to accommodate all students who need extra test time without advanced request.

Religious Observance

Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

Excused Absences for University

Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)

Extracurricular Activities

Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)

Student Learning Outcomes

This is a calculus based course which will include some basic integration, differentiation, and discussion of the use of differential equations. Students will learn about the following topics: the concept of an electromagnetic (EM) field; understand the concepts of charge and current; know the concept of electrostatic potential and why it is useful; build an electric circuit and predict it's behavior; understand duality of light.

1. Students will be able to develop quantitative models as related to the course subject matter.

2. Students will be able to assess the strengths and limitations of quantitative models and methods.

3. Students will be able to apply symbolic systems of representation.

4. Students will be able to test hypotheses and make recommendations or predictions based on results.

5. Students will be able to communicate and represent quantitative information or results numerically, symbolically, aurally, visually, verbally, or in writing.

Teaching strategies

First 15 minutes of the class are reserved for quizzes. The next 60 minutes are devoted to lecture and demonstrations. Here, a concept is presented to emphasize practical/real-life applications, stressing important definitions and limitations. The rest of the class is devoted to solving set of problems and question-answer sessions, the students are guided in a discussion to develop solutions to the problems. Daily homework and quizzes will be assigned. Students are expected to dedicate minimum of 1 hr a day to this course outside the classroom.

Material to be covered in the course :

Thursday May 11 2023

Intro

Charge and Electrostatics Coulomb's law

The Electric Field

The electric field
Point-charge distributions

HW 1 assigned due on Friday May 26 2023 by 11:59 pm

Quiz 1 on Coulomb's Law and Electric field,
Continuous charge distributions
Motion of charged particles in an electric field

Friday May 12 2023

Gauss' law

Electric flux
Gauss's law (general)
Gauss's law and various continuous charge distributions

HW 2 assigned, due on Friday May 26 2023 by 11:59 pm

Quiz 2 on Gauss' Law

Monday May 15 2023

Electric Potential (part 1)

Electric potential and potential difference
Potential differences in uniform electric fields

Potential and point charges
Potential and continuous charge distributions

Capacitance

Capacitance
Gauss' law and capacitance

Combination of capacitors Energy stored in capacitors Dielectrics

HW 3 assigned, due on Friday May 26 2023 by 11:59 pm

Quiz 3 on Potential difference and Capacitance

Tuesday May 16 2023

DC circuits

Ohm's law
Resistivity
Electrical power

HW 4 assigned, due on Friday May 26 2023 by 11:59 pm

Quiz 4 on DC circuits

Wednesday May 17 2023

Electromotive force and internal resistance
Equivalent resistance

Kirchhoff's rules RC circuits

HW 5 assigned due on Friday May 26 2023

Quiz 5 on Kirchhoff's rules

Thursday May 18 2023

Magnetism

Magnetic force on moving charges and currents
Path of moving charge in a magnetic field
Hall effect

Biot-Savart law

Parallel conductors Ampere's law Solenoids and toroids

HW 6 assigned due on Friday May 26 2023

Quiz 6 on Magnetic force, Biot-Savart, Ampere's laws

Friday May 19 2023

Magnetic Induction

Magnetic flux
Gauss's law of magnetism Faraday's law of induction
Lenz's law
Induced emf and electric fields

Generators and motors

HW 7 assigned due on Friday May 26 2023

Quiz 7 on Faraday's and Lenz's laws

Monday May 22 2023

Inductance

Self-inductance
RL circuits
Energy in magnetic fields
Mutual inductance
Electronic oscillations in LC circuits The RLC circuit

Alternating Current

HW 8 assigned due on Friday May 26 2023

Quiz 8 on RLC circuits

Tuesday May 23 2023

Electromagnetic waves

Nature of light

Lenses

Interference

Diffraction

HW 9 assigned due on Friday May 26 2023

Quiz 9 on Mirrors, lenses and diffraction

Wednesday May 24 2023

Preparation for the Final Exam

Thursday May 25 2023

Final Exam (Cumulative) at 9 am-12 pm in class Fondren Science Building

Grading

"Final Grade" will be calculated as following:

10% Class Participation + 30% Quizzes +
30% Homework + 30% Final Exam Grade

Letter grade breakdown:

"A" : [91%-100%] ,

"A-" : [88%-90%] ,

"B+" : [83%-87%] ,

"B" : [78%-82%] ,

"B-" : [73%-77%] ,

"C+" : [69%-72%] ,

"C" : [64%-68%] ,

“C-” : [61%-63%] ,

“D” : [50%-60%] ,

“F” < 50%

There is no grade curving in this course

One lowest Homework grade and one lowest Quiz grade will be dropped.

Final Exams: Please, refer to Academic calendar at http://smu.edu/ registrar/ academic_calendar.asp