

JanTerm 2023
Syllabus for
“Introductory Electricity
and Magnetism ”



PHYS 1304

INTRO E&M DR. D BALAKISHIYEVA

cogito, ergo sum

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 every week day from 9 am till 4 pm.

This includes 1 hr lunch break. Tentative lunch time is 12 pm (this time can change upon request from students)

Monday Jan 9 2023 will be the reading day.

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.

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)

A student who is absent from class without valid reason for two consecutive weeks will be administratively dropped from the class by the instructor

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 :

Tuesday January 3 2023

Intro

Charge and Electrostatics Coulomb's law

The Electric Field

The electric field

Point-charge distributions

Continuous charge distributions

Motion of charged particles in an electric field

HW 1 assigned due on Jan 13 by 11:59 pm

Wednesday January 4 2023

Quiz 1 on Coulomb's Law and Electric field (online through "Wiley resources" tab on Canvas)

Gauss' law

Electric flux

Gauss's law (general)

Gauss's law and various continuous charge distributions

HW2 assigned, due on Jan 13 by 11:59 pm

Electric Potential (part 1)

Electric potential and potential difference

Potential differences in uniform electric fields

Potential and point charges

Potential and continuous charge distributions

Thursday January 5 2023

Quiz 2 on Gauss' Law (online through "Wiley resources" tab on Canvas)

HW3 assigned, due on Jan 13 by 11:59 pm

Capacitance

Capacitance

Gauss' law and capacitance

Combination of capacitors Energy stored in capacitors Dielectrics

Friday January 6 2023

Quiz 3 on Electric Potential and Electric Potential difference (online through "Wiley resources" tab on Canvas)

DC circuits

Ohm's law

Resistivity

Electrical power

Electromotive force and internal resistance

Equivalent resistance

Kirchhoff's rules RC circuits

HW 4 assigned, due on Jan 13 by 11:59 pm

Reading Day

Tuesday January 10 2023

Quiz 4 on Capacitance (online through "Wiley resources" tab on Canvas)

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 5 assigned, due on Jan 13 by 11:59 pm

Wednesday January 11 2023

Quiz 5 on Potential difference and Capacitance
(online through "Wiley resources" tab on Canvas)

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

Inductance

Self-inductance

RL circuits

Energy in magnetic fields

Mutual inductance

Electronic oscillations in LC circuits The RLC circuit

Alternating Current

Thursday January 12 2023

Quiz 6 on Magnetic force, Biot-Savart, Ampere's , laws, Inductance (online through "Wiley resources" tab on Canvas)

Electromagnetic waves

Nature of light

Lenses

Interference

Diffraction

Preparation for the Final Exam

HW 6 assigned, due on on Jan 13 by 11:59 pm

Friday January 13 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

