# *JanTerm 2021*
# *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. 11th 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 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)

## COVID-19 safety strategies

If a student will chose to attend the class in person, he/she will have to wear a face covering that will cover nose and mouth. Students will have to maintain 6 ft distance from other students. Those that refuse to follow this policy will not be allowed to stay in the classroom and will be asked to leave.

# 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** and **PHYS1303**

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 for all tests through DASS. 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 through DASS in advance.** Our schedule makes it impossible to accommodate all students who need extra test time.

# 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 :

Monday January 4 2021

### 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 Tuesday Jan 5 by 11:45 pm

Tuesday January 5 2021

Quiz 1 on Coulomb's Law and Electric field (15 min in class)

## Gauss' law

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

## Electric Potential (part 1)

Electric potential and potential difference
Potential differences in uniform electric fields

Potential and point charges
Potential and continuous charge distributions

HW 2 assigned, due on Wednesday Jan 6 by 11:45 pm

Wednesday January 6 2021

Quiz 2 on Gauss' Law ( 15 min in class)

## Capacitance

Capacitance
Gauss' law and capacitance

Combination of capacitors Energy stored in capacitors Dielectrics

## DC circuits

Ohm's law
Resistivity
Electrical power

Electromotive force and internal resistance
Equivalent resistance

Kirchhoff's rules RC circuits

HW 3 assigned, due on Thursday Jan 7 by 11:45 pm

Thursday January 7 2021
Quiz 3 on Potential difference and Capacitance ( 15 min in class)

## 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 4 assigned, due on Friday Jan 8 by 11:45 pm

Friday January 8 2021

Quiz 4 on Magnetic force, Biot-Savart, Ampere's , laws (15 min in class)

## 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

HW 5 assigned, due on Saturday January 9 2021 at 11:45 pm

Saturday January 9 2021

Quiz 5 on Faraday's and Lenz's laws, on RLC circuits ( 15 min in class)

## Alternating current

Electronic oscillations in LC circuits The RLC circuit

HW 6 assigned due on Monday January 11 2021 at 11:45 pm

Monday January 11 2021

Quiz 6 on RLC circuits ( 15 min in class)

## Electromagnetic waves

Nature of light

Mirrors and Lenses

HW 7 assigned due on Tuesday January 12 2021

Tuesday January 12 2021

Quiz 7 On Light, mirrors and lenses

Interference

Diffraction

HW 8 assigned due on Wednesday January 13 2021 at 11:45 pm

Wednesday January 13 2021

Quiz 8 on interference and diffraction (15 min in class)

Thursday January 14 2021

Preparation for the Final Exam

Friday January 15 2021

**Final Exam ( Cumulative) at 10 am-1 pm**

# Grading

"Final Grade" will be calculated as following:

30% Quizzes + 30% Homework + 40% 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.***