Summer 2 Term 2021

July 6 - August 4

Syllabus for 1304 "Introductory Electricity and Magnetism "

INTRO E&M DR. D BALAKISHIYEVA

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 on Zoom from 10 am till 11:50 am. Zoom link will be posted on Canvas in announcements.

There will be 1 hr office hour after the classes, at 3 pm on Zoom. Zoom link will be posted on Canvas in announcements.

Course description

Introductory Electricity and Magnetism is a calculus based college- level physics course for engineering and physics majors.

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 Summer 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 :

Monday July 6 2020

Intro

Charge and Electrostatics Coulomb's law

HW 1 assigned due on Tuesday July 7 by 11 pm

Tuesday July 7 2020

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

The Electric Field

The electric field
Point-charge distributions

HW 2 assigned, due on Wednesday July 8 by 11 pm

Wednesday July 8 2020

Quiz 2 on E-field (15 min in class)

Continuous charge distributions
Motion of charged particles in an electric field

HW 3 assigned, due on Thursday July 9 by 11 pm

Thursday July 9 2020

Quiz 3 on E-field for continuous charge distribution (15 min in class)

Gauss' law

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

HW 4 assigned, due on Friday July 10 by 11 pm

Friday July 10 2020

Quiz 4 on Gauss' Law (15 min in class)

Electric Potential (part 1)
Electric potential and potential difference
Potential differences in uniform electric fields

HW 5 assigned due on Monday July 13 2020

Monday July 13 2020

Quiz 5 on Electric potential (15 min in class)

Potential and point charges
Potential and continuous charge distributions

HW 6 assigned due on Tuesday July 14 2020

Tuesday July 14 2020

Quiz 6 on Potential difference (15 min in class)

Capacitance

Capacitance
Gauss' law and capacitance

Combination of capacitors Energy stored in capacitors Dielectrics

HW 7 assigned due on Wednesday July 15 2020

Wednesday July 15 2020

Quiz 7 on Capacitance (15 min in class)

DC circuits

Ohm's law
Resistivity
Electrical power

HW 8 assigned due on Thursday July 16 2020

Thursday July 16 2020

Quiz 8 on DC circuits (15 minutes on class)

Electromotive force and internal resistance
Equivalent resistance

Kirchhoff's rules RC circuits

HW 9 assigned due on Friday July 17 2020

Friday July 17 2020

Quiz 9 on Kirchhoff's rules (15 min in class)

Magnetism

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

HW 10 assigned due on Monday July 20 2020

Monday July 20 2020

Quiz 10 on Magnetic force (15 min in class)

Biot-Savart law

Parallel conductors Ampere's law Solenoids and toroids

HW 11 assigned due on Tuesday July 21 2020

Tuesday July 21 2020

Quiz 11 on 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

HW 12 assigned due on Wednesday July 22 2020

Wednesday July 22 2020

Quiz 12 on Faraday's and Lenz's laws (15 min in class)

Inductance

Self-inductance
RL circuits

HW 13 assigned due on Thursday July 23 2020

Thursday July 23 2020

Quiz 13 on RL circuits (15 min in class)

Energy in magnetic fields
Mutual inductance
Electronic oscillations in LC circuits

HW 14 assigned due on Friday July 24 2020

Friday July 24 2020

Alternating Current

The RLC circuit

Quiz 14 on RLC circuits (15 min in class)

Electromagnetic waves

Nature of light

Mirrors

HW 15 assigned due on Monday July 27 2020

Monday July 27 2020

Quiz 15 on light and mirrors (15 min in class)

Lenses

HW 16 assigned due on Tuesday July 28 2020

Tuesday July 28 2020

Quiz 16 on lenses (15 min in class)

Interference

Diffraction

HW 17 assigned due on Wednesday July 29 2020

Wednesday July 29 2020

Quiz 17 on interference and diffraction (15 min in class)

Thursday July 30 2020- Monday Aug 3 2020

Preparation for the Final Exam

Tuesday Aug 4 2020

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