

# *Syllabus for “Introductory Electricity and Magnetism ”*

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## **PHYS 1304**

INTRO E&M DR. D BALAKISHIYEVA

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# **Textbooks and online homework system:**

*Primary textbook: Fundamentals of Physics Halliday, David, Robert Resnick, and Jearl Walker. 11th edition New York: John Wiley & Sons.*

***Online homework system: WileyPlus.com***

*It is mandatory to purchase an online access code for an online homework submission. This code will give also an access to an electronic version of the textbook.*

*The WileyPlus learning system is the primary automated way in which you will access the course textbook and provide answers to homework problems. It is your responsibility to become familiar with this system. Failure to do so will create artificial roadblocks to your learning process.*

*The reason we utilize the WileyPlus system is that it is backed by a large team of people who can help you in the system when problems arise. If you have followed my advice and purchased the WileyPlus bundle that includes the full electronic textbook and the course learning system, you have the following at your fingertips:*

- 1. The complete textbook for all semesters, including video demonstrations of concepts and examples of how to solve*

*physics problems. In addition, you can print (either to paper or to a format like PDF) whole sections and chapters from the book and carry them around with you (e.g. in a folder or binder, or on a mobile device).*

*2. An extensive catalog of study problems to augment those assigned by me for homework and other learning exercises.*

*3. A built-in student help system for when you have any technical problems, allowing you to speak to a Wiley system expert if there are issues with account access, problems with written or video material, etc.*

*Please note that if your problem(s) are not easily resolved by the Wiley staff via their system help options, you should then report the problem to me and I will contact our institutional Wiley representative. They have supervisory authority and can solve even the most difficult problems with the system. Their whole job is to make our learning experience easier, but we must use them wisely and you must always seek help through the normal WileyPlus student help system first before coming to me.*

*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.*

## **Course description**

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

## **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 for each test through DASS. Our class size 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)

## **COVID-19 safety strategies**

If a student will chose to attend the class in person, he/she/they 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.

## **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**

30 - 35 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 (whole class or small group) to develop solutions to the problems. Weekly homework and quizzes will be assigned. Students are expected to dedicate minimum of *6 hrs/week* to this course outside the classroom.

## **Material to be covered in the course :**

### **Intro**



1 week

Charge and Electrostatics Coulomb's law

Quiz 1

*HW 1*

## The Electric Field

1.5 weeks

The electric field

Point-charge distributions

Continuous charge distributions

Quiz 2

*HW 2*

Motion of charged particles in an electric field

## Gauss' Law

1 week

Electric flux

Gauss's law (general)

Gauss's law and various continuous charge distributions

Quiz 3

HW 3

**Exam 1 (Statics, Coulomb law, Gauss Law) in class**

## Electric Potential

1 week

Electric potential and potential difference

Potential differences in uniform electric fields

Potential and point charges

Potential and continuous charge distributions

Quiz 4

HW 4

## Capacitance

1 week

Capacitance

Gauss' law and capacitance

Combination of capacitors Energy stored in capacitors Dielectrics

Quiz 5

HW 5

## DC Circuits

2 weeks

Ohm's law

Resistivity

Electrical power

Quiz 6

HW 6

Electromotive force and internal resistance

Equivalent resistance

Kirchhoff's rules RC circuits

Quiz 7

HW 7

**Exam 2 (El. Potential, Capacitance, DC circuits)  
in class**

# Magnetism

2 weeks

Magnetic force on moving charges and currents

Path of moving charge in a magnetic field

Hall effect

Quiz 8

HW 8

Biot-Savart law

Parallel conductors Ampere's law Solenoids and  
toroids

Quiz 9

HW 9

# Magnetic Induction

1.5 weeks

Magnetic flux

Gauss's law of magnetism Faraday's law of induction

HW 10

Quiz 10

Lenz's law

Induced emf and electric fields

Generators and motors,

Maxwell's equations

**Test 3 (Magnetic Force, Magnetic flux, Faraday's and Lenz's laws) in class**

## Inductance

1 week

Self-inductance

RL circuits

Energy in magnetic fields

Mutual inductance

Electronic oscillations in LC circuits The RLC circuit

Quiz 11

HW 11

## Alternating Current

1 week

## Electromagnetic waves

1 week

Nature of light Interference Diffraction

Quiz 12

HW 12

**Final Exam ( Cumulative) 3 hrs long**

**Final Exams schedule:** Please, refer to Academic calendar at [http://smu.edu/registrar/academic\\_calendar.asp](http://smu.edu/registrar/academic_calendar.asp)

## Grading

All of the homework assigned on WileyPlus.com will be graded by WileyPlus software and those grades will be kept on WileyPlus.com website. Above mentioned grades will not be transferred onto Canvas site but taken into account at the end for final grade calculation.

Final Grade will be calculated as following:

“Final Grade” will be calculated as following:  
 $2 \times 20\% \text{ Tests} + 20\% \text{ Online Quizzes} + 20\% \text{ Homework} + 20\% \text{ Final Exam Grade}$

Letter grade breakdown:

“A” : [ 93%-100%] ,

“A-” : [89%-92%] ,

“B+” : [83%-88%] ,

“B” : [78%-82%] ,

“B-” : [73%-77%] ,

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“C+” : [69%-72%] ,

“C” : [64%-68%] ,

“C-” : [61%-63%] ,

“D” : [50%-60%] ,

“F” < 50%

***There is no grade curving in this course***

***One lowest Test grade (excluding Final Exam) and one lowest online Quiz grade will be dropped.***

Tests and Final Exam will not have extra credit problems. There is no makeup test or exam.

Students will take 3 tests and after lowest grade will be dropped 2 equally weighted (20% each ) tests grades will remain.





