Syllabus

COURSE SYLLABUS FORM

American University of Beirut

Faculty of Arts and Sciences

Department of Physics

Course Number and Title: Phys 211 - Electricity and Magnetism

1. Course description

This is the first course in Electricity & Magnetism intended for Majors in Mechanical, Electrical, CCE engineering and Chemistry. Physics Major Students can take it if they are pre-med students. The subject matter is the concepts in Electricity and Magnetism and their applications, starting from the concept of electrical charges up to the use of global form of the four Maxwell’s equations to understand the electromagnetic waves in vacuum. Math 201 is a prerequisite for this course as it is a calculus based course. A certain amount of proficiency in differential and integral calculus is essential, as well as a good knowledge of spherical and cylindrical coordinate systems. Vector calculus is required at its elementary properties: addition, multiplication, and projection of vectors. Symmetry arguments are considered in many places in the course.

The course will introduce the Electrostatics and the stationary regime, at an introductory level, while the Magnetostatics consider the magnetic field and its consequences. The student will learn how to use Coulomb’s law, Gauss’s Law, Electric Potential, Biot Savart’s law and Ampere’s Law. The Faraday-Lenz’s law introduces the time effects. Alternating currents are considered as an application. Finally, Maxwell’s equations build up the Electromagnetism. The electromagnetic waves in vacuum are introduced.

2. Intended students learning outcomes

Upon a successful completion of the course the student will be able to:

Grasp the physical concepts related to the material covered in the course.

Develop problem-solving skills through conceptual understanding and calculus based mathematical modeling of the underlying physics.

Acquire scientific and intellectual abilities such as critical thinking and independent learning.

Apply Coulomb’s Law and Gauss’ Law for solving simple charge distributions problems.

Employ vector analysis methods to assemble Electricity and Magnetism laws.

Describe the dielectric properties of isotropic materials and to solve problems involving dielectrics,

Apply Biot-Savart Law and Ampere’s Law.

Interpret the interaction between current and magnetic field by Lorentz Law.

Describe the characteristic of basic circuit elements such as the ideal resistor, capacitor and inductor.

Solve and interpret simple AC/DC circuit using Kirchhoff’s laws.

Analyze an AC resonant circuit and induced emf.

Discuss Maxwell’s equations and Electromagnetic waves in vacuum.

3. Resources Available to Students

A- Required for the lectures, the textbook: Physics for Scientist and Engineers Vol.2

By: Serway and Jewett, 9th Edition.

B- Other similar textbooks can be found in AUB Libraries. We recommend the book:

Fundamental of Physics (Extended 5th Ed.) By: Halliday, Resnick and Walker.

C- The lectures and the recitations will be posted as pdf files on Moodle.

3. Grading Criteria

There will be two quizzes (60-75 minutes each) and a final exam (2 to 3 hours). The dates will be given during the lectures. The first quiz will cover chapters 23-26; the second quiz will cover chapters 27-30. The Final exam will consider the whole material (12 Chapters).

The final grade will be the weighted average of the two quizzes (50%) and the final exam (50%).\*

\*The weights of the different exams may be amended by the instructor.

4. Schedule

Mainly, every week one chapter will be introduced in the order shown below.

Week

Chapter

1st week: Sept. 3-5

Introduction

2nd week: Sept. 8-12

#23: Electric Fields

3rd week: Sept. 15-19

#24: Gauss’s Law

4th week: Sept. 22-26

#25: Electric Potential

5th week: Sept. 29- Oct. 3

#26: Capacitance and Dielectrics

6th week: Oct. 7-10

#27: Current and Resistance

Quiz 1

7th week: Oct. 13-17

#28: Direct-Current Circuits

8th week: Oct. 20-24

#29: Magnetic Fields

9th week: Oct. 27-31

#30: Sources of the Magnetic Field

10th week: Nov. 4-7

#31: Faraday’s Law

Quiz 2

11th week: Nov. 10-14

#32: Inductance

12th week: Nov. 17-21

#33: Alternating-Current Circuits

13th week: Nov. 24-28

#34: Electromagnetic Waves

The list of class problems to be solved during recitation sessions will be given every week.

5. Course Policy

Attendance: Attendance of the lectures and recitations is mandatory. If a student misses a lecture or recitation, he/she is entirely responsible for the material covered as well as any announcement that was done during class time. Any student arriving late (i.e. after the start of the lecture or a recitation) may not be allowed to attend the rest of the class.

Office Hours: The Phys211 instructor will fix two office hours per week at the beginning of the semester. During these hours students can see the teacher in his office (Bustani Bldg.) to ask questions and discuss problems related to the materials covered. Students who are not available during the office hours may directly arrange for an appointment with the teacher.

Missing a quiz or the Final Exam: No make-ups will be given for missed quizzes. In case of absence from a quiz due to a justified “force majeure”, the weights of the remaining quizzes may be readjusted, if the instructor of the course considers the reason for the absence valid. Medical reports will be considered only if, they are issued by the University Health Services of AUB or the AUB Medical Center. A make-up for a missed final exam will be given only after the Administrative Committee of the Faculty of Arts and Sciences approves the request for such a make-up.

Cheating: Any student caught cheating or attempting to cheat during an exam will be dismissed on the spot and will receive a grade of zero on the corresponding exam. Any such case will also be reported to the Students Affairs Committee for further action to be taken. Action could include the student being awarded a failing grade in the course and a Dean’s warning as well as the possibility of being dismissed from the University.

Class discipline: No eating, drinking, smoking or use of mobile phones is permitted during class time. The instructor reserves the right to dismiss from class, any student acting in a manner that is considered disruptive or counterproductive to the teaching/learning process in the classroom.

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