Physics 211 Electricity and Magnetism

Syllabus: Second Semester 2017-2018

Text: Principles of Physics

Walker Halliday and Resnick

(chapter 21-33)

Also as an alternative

Text: Physics for scientists and Engineers with Modern Physics

R. A. Serway & J. W. Jewett, jr.

Topics to be covered:

I. Electric Fields

II. Gauss’ Law

III. Electric Potential

IV. Capacitance and Dielectrics

V. Current and Resistance

VI. Direct Current Circuits

Quiz I

VII. Magnetic Fields

VIII. Sources of the Magnetic Field

IX. Faraday’s Law

X. Inductance

Quiz II

XI. Alternating Current Circuits

XII. Electromagnetic Waves

This introductory survey of the classical theory of Electromagnetic fields lays the basic concepts employed in this field of physics and introduces the tools for further studies in this area.

The behavior of static electric and magnetic fields is introduced first. This is then followed by their time interdependence, leading to Maxwell’s equations and the prediction of the existence of Electromagnetic waves.

The basic concept of “field” to describe electric and magnetic phenomena is defined mathematically and is clarified. Basic calculus is employed to quantify the laws that govern them to be followed by the development of differential equations which are used to solve more advanced problems leading to basic understanding of Electro-magnetic waves.

One outcome of the course is a basic first level understanding of such electro-magnetic phenomena.

Simple circuits of basic electric elements (resistors, capacitors and inductors) are presented and analyzed for direct and alternating current sources. A basic understanding of such simple circuits is another expected outcome of the course.

The course will consist of two general lectures a week followed by a discussion session for problem solving.

Evaluation of performance will be based on two 50 minute quizzes and a final examination. The grade will be based on 25% for each quiz and 40% for the final exam. Participation in class and solving assigned problems will get the remaining 10%.

The quizzes will take place on the following two dates:

Quiz I : Friday March 9, 5 PM (Tentative date)

Quiz II : Friday April 20, 5 PM (Tentative date)

Each quiz covers the material introduced up to that date. The final is a comprehensive examination over the whole material.

Problems will be assigned and solved in discussion periods.

K. Bitar

January 30, 2018.