



Department of Physics

College of Education

University of Salahaddin

Subject: Electricity and Magnetism

Second semester

Course Book:(First Year Student)

Lecturer's name: Dr. Sardar P. Yaba

Academic Year: 2023-2024

Course Book

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| 1. Course name | Electricity and Magnetism |
| 2. Lecturer in charge | Dr. Sardar P. Yaba |
| 3. Department/ College | Physics/ Education |
| 4. Contact | e-mail:sardar.yaba@su.edu.krd |
| 5. Time (in hours) per week | Theory: 3 Hours |
| 6. Office hours | Saturday 8.30 - 11.30 Class Time: Sunday: From 10.30 To 12.30 Tuesday: From 10.30 To 12.30 or by appointment. |
| 7. Course code | |
| 8. Teacher's academic profile | BSc (1988 –1989) Physics Department of Physics , College of Education University of Salahaddin /Erbil, Kurdistan Region, Iraq.MSc (1995) in Medical Physics, Department of Physics., College of Education University of Salahaddin /Erbil, Kurdistan Region, Iraq.Ph.D (2009) in Medical Physics - Department of Physics., College of Science /University of Salahaddin /Erbil, Kurdistan Region, Iraq.Teaching Staff since 1995 in Physics - Department of Physics, College of Education, University of Salahadin Erbil – Iraq.I was teaching at nearly all labs of physics dept. and lectured electricity and magnetism, , medical physics, and Research methods. |
| 9. Keywords | |
| 10. Course overview: | This course will through one semester. The students will study many physical aspects of electricity and magnetism during that. In this course, students will also learn about Capacitance and dielectrics, Current, Resistance, Electro Motive Force, Electric Circuits and Magnetism. |
| 11. Course objective: | The aim of the study of electricity and magnetism is to make the student familiar with the fundamentals of electricity and magnetism in physics. We will learn the nature of the electric charge, and how objects become electrically charged. Explanation of Capacitance and Dielectric. Understanding of Current, Resistance, and Resistivity. Knowledge of Circuits, Kirchhoff's voltage law. The magnetic field, the Magnetic field around a current-carrying conductor, Magnetic flux, the magnetic force, the motion of charged particles in the uniform magnetic field and the Hall Effect. |

12. Student's obligation

Students should attend all the lectures and they may take notes during the lectures. In addition, in-class participation would be an advantage for them to extend their knowledge and understand the module systematically.

Attending the lectures regularly would be a crucial point for the students to consider. If the students missed a few lectures, they would have difficulty getting back on track.

Furthermore, all exams and tests are done with books closed, and, students have to take at least two compulsory exams with few class tests and quizzes during the semester of study.

13. Forms of teaching

During this course, I am using some ways to make the students engage with the lecture like PowerPoint slides explanation view, the whiteboard in the class, and videos and animations to explain the theory of the subject with the explanation in the class. If there were slides that needed more explanation, or, if the slide needed a long, explanation and I thought that the students must know all of that, I would distribute the description to the students to widen their knowledge of the subject.

14. Assessment scheme

In this system, the maximum mark is **(75%)**. The grading system is based on the summation of two categories of evaluations:

First, (25%) of the mark is based on the academic year effort of the student which includes:

- A- 20% for midterm examination,
- B- 5 % marks for the homework, quizzes, and classroom activity.

Second, (50%) of the mark is based on the final examination that is comprehensive for the whole of the study material reviewed during the semester.

15. Student learning outcome:

After successful completion of the courses, the students learn:

1. The comprehensive understanding of the fundamental concepts of electricity and magnetism.
2. Complete knowledge of the fundamental laws of electricity and magnetism.
3. The analytical skills for solving problems in Electricity and Magnetism to reinforce conceptual understanding.

16. Course Reading List and References:

The main textbooks are:

- 1- Physics for Scientists and Engineers by Serway Jewett, 6th Edition (2004).
- 2- University Physics With Modern Physics by Young and Freedman (2007)
- 3- Electricity and Magnetism, by Benjamin Crowell, (2007).
- 4- Fundamentals of Electricity and Magnetism by D.N. Vasudeva (2000).

17. The Topics:

Lecturer's name

A tentative lecture schedule is:

• Week 1, and 2: Capacitance and dielectrics Capacitance (C)

Capacitance

Calculating Capacitance

Combinations of capacitors

Energy storage in capacitors

Capacitors with Dielectrics

• Week 3,4, 5, and 6: Current, Resistance, Electro Motive Force, and Electric Circuits

Current Microscopic Model of Current

Current Density

Relation between drift velocity and current density

Relation between current density and electric field

Resistivity

Resistance

Ohms law

Electromotive Force (emf)

Electrical Power

Direct Current Circuits

The circuit equation

Kirchhoff's Rules

The Wheatstone bridges

RC Circuits

Charging a capacitor

Discharging Process

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• **Week 7,8, Magnetic field**

The magnetic field

Magnetic field around a current-carrying conductor

Magnetic flux

The magnetic force

The motion of charged particles in the uniform magnetic field

The Hall Effect.

19. Examinations:

Different types of questions will be provided to the student as an exercise and also in examinations such as given in the question banks which contain each of the following ones:

1. Mathematical derivation and explanation questions for different subjects in calculus are provided.
2. Multiple choices questions for every subject that is given in calculus topics are also provided to them.
3. Explaining and Definition
4. Finally, the true and false questions are also given to them for several mathematical subjects.

Each of these mentioned question types will be seen clearly in the question banks that are given to the quality assurance committee of our physics department.

20. Extra notes:

There are too many unnecessary holidays that reduce topics given to students. Due to a number of unforeseen reasons that may lead to the shifting of the academic year program, it may be subjected to modifications. Also, extra curriculum hours may be needed to cover all the topics mentioned above.

21. Peer review