



Sule Lamido University, Kaffin Hausa
Faculty of Natural and Applied Sciences
Department of Physics
2019/2020 First Semester

Course Title: Electromagnetism

Course Code: PHY 339

Credit Unit: 3

Course Staff

Lecturer: Dr. Nasir Faruk Room No.

Laboratory Instructor: Mal.

Course Prerequisites: Electricity and Magnetism, Vector Analysis, Differential and Integral Calculus

Lecture Period: Wednesday 10:00 am – 12:00 pm

Lecture Venue: Physics Laboratory

Reference Texts:

1. Electromagnetic Field and Waves , 2nd ed, 1970, Freeman, *Lorrain and Corson*
2. Electromagnetic Field and Waves, National Broadcasting Commission, 2000, *Ikata Eghuanoye*
3. Theory and Problems of Electromagnetics, 2nd Ed, 2003, The McGraw-Hill, Joseph A. Edminister
4. Schaum's Theory and Problems of Vector Analysis (Outline Series and an introduction to Tensor Analysis) Paperback – 1959 by Murray R Spiegel
5. Engineering Electromagnetics, Williams H, 8th edition, Mc Graw Hill

Lecture Notes: Lecture guides will be given to the class representative at least a day before each lecture. The lecture guides are not for sale.

Course Objectives:

The objectives of the course are as follows:

1. to apply the principles of Coulombs Law and the Superposition Principle to electric fields in the Cartesian, cylindrical and spherical coordinate systems.
2. to determine the electric field intensity resulting from various configurations of charge distributions..
3. to determine the electric potential and its relation to electric field intensity
4. to have an in depth understanding of electric fields in dielectric and semiconducting materials.
5. to have an in depth study of electrostatic boundary-value problems by application of Poisson's and Laplace's equations.

6. To understand time-varying electromagnetic field as governed by Maxwell's equations.
7. An in depth understanding of plane wave reflection and transmission at the boundaries.
8. Basic understanding of AC Circuits

Measurement of Course Outcome:

At the end of the course, a student will be able to:

1. formulate potential problems within electrostatics, magnetostatics and stationary current distributions in linear, isotropic media.
2. define and derive expressions for the energy both for the electrostatic and magnetostatic fields, and derive Poyntings theorem from Maxwells equations and interpret the terms in the theorem physically
3. describe and make calculations of

Course Grading:

1. Homework / Project: **10%**
2. Continuous Assessment Tests: **30%**
3. Final Examination: **60%**
4. Students are advised not to write exams when they are sick and are unable to write such exams. They are to apply for make-up exam, if they miss an exam, with corroborating evidence from the University clinic.

General Information:

1. Students must attend a minimum of 75% of the total lecture hours in order to be eligible to write the final exam. Students should notify the course staff of any intended absence from a lecture or laboratory at least a day prior to such lecture or laboratory. In a situation where the student is ill, an official documentation should be obtained from the university clinic.
2. Homework will be given in the form of problem sets. A total of five problem sets will be handed out, the last of which will be a class project. Solutions have to be turned in by 12 midnight of submission date. Late submissions will be penalized. Solutions are to be submitted through the class email (nasirfaruk@gmail.com).
3. The continuous assessment tests will be conducted in the weeks five and ten of the semester; thereafter, lecture commence for the week..
4. The final examination timetable will be as scheduled by the Faculty. Students are expected to liaise with the Sub-dean of the faculty to make sure that there are no clashes on their examination schedule.
5. Students are encouraged to meet with course staff to sort out any administrative and academic issues they may have relating to the course.
6. Students will be expected to fill out an online course assessment form, midway through the semester to get a feedback of what their lecture and laboratory experiences have been.
7. Students are encouraged to collaborate on assignments but every student must do the assignment on their own. It is important for student to note that cheating or any kind of academic dishonesty will not be tolerated and will be met with harsh punishment by the university administration if discovered (Please refer to student handbook).

Lecture Schedule

Lect. No.	Date	Topic
1	Week 1	Course Administration and Review of Vector Algebra
2	Week 2	Vector Calculus
3	Week 3	Divergence and Divergence theorem
4	Week 4	Electrostatics: Coulomb forces and Electric field intensity
5	Week 5	(Test 1) Electrostatic field: Work, Energy and Potential
6	Week 6	Electrostatic Field: Current density and Conductors
7	Week 7	Magneto static: Ampere's Law and Magnetic Field
8	Week 8	Maxwell's Equations and Boundary Conditions
9	Week 9	Dielectrics and Electromagnetic Materials
10	Week 10	(Test 2) A.C Circuits
11	Week 11	Special Relativity
12	Week 12	MATLAB Simulations
13	Week 13	General Course Revision

Problem Sets

P.S No.	Topic	Date Assigned	Duration
1	Vector Calculus	Week 2	1 Week
2	Divergence and Divergence theorem	Week 3	1 week
2	Maxwell's Equations and Boundary Conditions	Week 8	1 Week
4	Dielectrics and Electromagnetic Materials	Week 9	1 week
5	A.C Circuits	Week 10	1 week