ELE2103 ELECTROMAGNETICS

Hours per Semester				Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
45	30	00	60	100	60	40	4

Brief Course Description

The course builds on Electromagnetics I to provide concepts on electric and magnetic fields in material space.

Course Objectives

By the end of the course students should be able to:

- Understand the theoretical background of static electromagnetic fields in material space.
- Derive and apply equations related to static electromagnetic fields in material space

Detailed Course Content:

Review of Vector Algebra: **[7 Hours]**

Classification of vector fields. Electrostatic Fields: Coulomb Law & Field Intensity. Electric Field due to Continuous Charge Distribution. Electric flux density, Gauss Law-Maxwell Equation. Electric potential; relationship between E and V-Maxwell Equation.

Electric Field in Material Space: **[16 Hours]**

Properties of materials, Convection and conduction current; Polarization in Dielectric; dielectric constant and strength; Continuity Equation and Relaxation Time; Boundary Conditions; Electrostatic Boundary-Value Problems; Poisson's and Laplace Equations; Electrostatic Boundary-Value Problems: Uniqueness Theorem, Procedure for solving Poisson's and Laplace equations, Resistance and Capacitance, Methods of Images

Magnetostatics: **[22 Hours]**

Biot-Savart's Law; ampere Circuital Law-Maxwell Equation. Application of Ampere's Law Magnetic Flux Density-Maxwell Equation. Maxwell Equation for Static EM Fields; Magnetic Scalar and Vector Potential, Magnetic Forces, Material and Devices: Forces due to Magnetic Fields; Magnetic Torque and Movement. Magnetic Forces, Material and Devices: Magnetization in Materials. Magnetic Forces, Material and Devices: Magnetic Boundary Conditions. Magnetic Forces, Material and Devices: Inductor and Inductance; Magnetic Energy.

Mode of Delivery

The course will be taught by using lectures, tutorials and assignments.

Assessment
Assignments, tests and final examination. Their relative contributions to the final grade are :

Requirement	**Percentage contribution**
Course work (Assignments, tests)	40%
Final examination	60%
Total	
100%	

Learning Outcomes
The course participant is able to attach quantitative meaning to the basic laws of Electricity and Magnetism, and also able to give daily-life analogies to the concepts studied. The student applies the electricity and magnetism laws studied to explain real situations.

Method of Teaching /Delivery
The course will be taught by using lectures, tutorials and assignments.

Mode of Assessment
Assignments, tests and final examination. Their relative contributions to the final grade are :

Requirement	**Percentage contribution**
Course work (Assignments, tests)	40%
Final examination	60%
Total	
100%	

Reference Material

[1] Matthew N.O. Sadiku, *Elements of Electromagnetics*, 3rd ed.,Oxford University Press, 2001

[2] Sears F., Zemansky M., Young H., *Electricity,Magnetism and Optics*.

[3] Murray R Spiegel, *Theory and Problems of Vector Analysis*, SI (Metric) ed., McGraw Hill

[4] William H. Hayt, Jr., *Engineering Electromagnetics*, 5th ed., Tata McGraw-Hill, New Delhi, 1997

Possible Lecturers:
Dr. E. Lugujjo
Mr. S. Mwanje
Mr. A Wasswa Matovu
Mr. P. Bogere
Mr. I. Kitone