



ALNAHRAIN UNIVERSITY
COLLEGE OF SCIENCE
Physics Dept.
2015-2016



Module Syllabus

Module Name: Electricity and MagnetismII
Lecturer Name: Dr. Hind S. Hussain

Module Number: PHY 12
Academic Rank: Lecturer

Aims:

This module introduces the student to the magnetic field and the relation between the physical quantities in magnetism. Topics include: magnetic field and its source , Faraday law, Lenz law, Inductance, Alternating current circuits, and electromagnetic waves.

Teaching Methods:

Duration: 16 weeks, 112 hours in total (64 lectures+48 lab.)

Lectures: 48 hours lectures + 48bHours Lab. 3 per week (including two 1-hour midterm exams).

Tutorial: 16 hours, 1 hour per week.

Learning Outcome:

Students completing this module should be able to:

1. Describe the magnetic field for steady currents and moving charges.
2. Calculate magnetic properties of simple current distributions using Biot-Savart and Ampere's laws.
3. Describe electromagnetic induction and related concepts, and make calculations using Faraday and Lenz's laws.
4. Describe the basic physical content of Maxwell's laws in integral form.
5. Work effectively with groups.

Module Outline:

Week	Subject
(1)	<ul style="list-style-type: none"> • Magnetic Fields and Forces, • Magnetic Force Acting on a Current-Carrying Conductor
(2)	<ul style="list-style-type: none"> • Torque on a Current Loop in a Uniform Magnetic Field, • Motion of a Charged Particle in a Uniform Magnetic Field • Applications Involving Charged Particles Moving in a Magnetic Field,
(3)	<ul style="list-style-type: none"> • The Hall Effect • The Biot–Savart Law
(4)	<ul style="list-style-type: none"> • The Magnetic Force Between Two Parallel Conductors, • Ampère’s Law, • The Magnetic Field of a Solenoid, Magnetic Flux



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(5)	<ul style="list-style-type: none">• Gauss's Law in Magnetism,• Displacement Current and the General Form of Ampère's Law,• Magnetism in Matter, The Magnetic Field of the Earth
(6)	<ul style="list-style-type: none">• Faraday's Law of Induction,• Motional emf• Lenz's Law,• Induced emf and Electric Fields
(7)	<ul style="list-style-type: none">• Generators and Motors,• Eddy Currents,• Maxwell's Equations
(8)	First Midterm Exam.
(9)	<ul style="list-style-type: none">• Self-Inductance,• RL Circuits,• Energy in a Magnetic Field
(10)	<ul style="list-style-type: none">• Mutual Inductance,• Oscillations in an LC Circuit,• The RLC Circuit
(11)	<ul style="list-style-type: none">• AC Sources,• Resistors in an AC Circuit• Inductors in an AC Circuit ,• Capacitors in an AC Circuit,• The RLC Series Circuit
(12)	<ul style="list-style-type: none">• Power in an AC Circuit,• Resonance in a Series RLCCircuit ,• The Transformer and Power Transmission• Rectifiers and Filters
(13)	Second Mid-Term Exam
(14)	<ul style="list-style-type: none">• Maxwell's Equations and,Hertz's Discoveries,• Plane Electromagnetic Waves, Energy Carried by Electromagnetic Waves
(15)	<ul style="list-style-type: none">• Momentum and Radiation Pressure,• Production of Electromagnetic Waves by an Antenna ,• The Spectrum of Electromagnetic Waves
(16)	Final Exam



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Modes and Assessment:

Modes of Assessment	Score	Date
First Mid-Term Exam.	7.5%	In the 8 th week
Second Mid-Term Exam.	7.5%	In the 13 th week
Quizzes.	5%	Every week
Assignments.	3%	Every week
Tutorial and contribution.	2%	Every week
Laboratory (15% for Evaluation, and 10% Mid-Term Exam).	25	
Final Exam.	50%	After the 16 th week

References:

1. Physics for Scientist and Engineers by Raymond A. Serway, John W. Jewett , 6th ed.2010
2. Electricity and Magnetism by Edward M. Purcell, 2nd ed., 2011

