هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	Electromagnetism-1
Course Code:	PHYS 221
Program:	B.Sc. in Physics
Department:	Department of Physics and astronomy
College:	College of Science
Institution:	King Saud University
Version:	2.0.0
Last Revision Date:	Sep 2023

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3(3+0+0)				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	Fourth level / second year.				
4. Course general Description Electrostatics, Gauss Law and its application, Capacitors, the magnetic field of conductors with different shapes, Ampere's law and its applications. Induced electromotive force, Faraday's law. Lenz's law, magnetic properties of matter, analysis of AC circuits, resonance in series and parallel circuits					
5. Pre-requirements for this course (if any): Phys 111					
6. Co- requirements for this course (if any): None					
7. Course Main Objective(s) 1. Use basics concepts of vector analysis to reformulate a static electromagnetic problem into the relevant equation needed to solve the problem. 2. Describe Physical Phenomena related to Electricity and Magnetism 3. Calculate physical quantities related to Electricity and Magnetism 4. Explain how to use electricity and magnetism in practical applications.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100%
2.	E-learning	0	0
3.	Hybrid • Traditional classroom • E-learning	0	0
4.	Distance learning	0	0

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize the basic concepts and principles of Static Electricity and Magnetism.	K1	• Give extensive examples during lecture. • Give problem sheets to be discussed during lecture..	• Hold Class discussion, tutorial sessions. • Give quizzes, mid-term exam and final exam.
1.2	Describe the derivation laws and principles in both electricity and magnetism.	K2		
2.0	Skills			
2.1	Evaluate integrals and differential needed to obtain the mathematical relations electricity and magnetism principles	S1	• Give extensive examples during lecture • Give problem sheets to be discussed during lecture and labs. • assignments. • Discussions in the classes	• Hold Class discussion, tutorial and lab sessions. • Give quizzes, mid-term exam and final exam.
2.2	Solve electricity and magnetism problems based on different chapters	S2		
3.0	Values, autonomy, and responsibility			
3.1	Work in a team and acknowledge others' work.	V1	• assignments. • Homework	Hold Class discussion

C. Course Content

No	List of Topics	Contact Hours
1.	**Electric field:** Coulomb's law, electric field, electric field of a dipole, charge density, lines of forces, applications of Gauss law, a point charge in an electric field, deflection of an electric beam, measurement of charge of electron with Millikan oil-drop experiment. **Electric potential:** electrostatic potential energy, potential, the relation between electric field and potential, potential due to a charged spherical conductor, sharing of charge be conductors, equipotential surface. **Capacitors and dielectrics:** capacitance, capacitors and its forms, capacitors, connection of capacitors, energy of a charged capacitor, introduction of dielectrics, effect of electric on the material, dielectric constant, polarization and electric displacement, dielectric strength. **Steady electric current:** electric current, electric conductivity and resistances (including Ohm's law, connection of resistors), EMF and internal resistance.	17
2.	**Magnetic fields and electric current:** the Boit-savart law, Amperes circuital law, Applications of magnetic field (due to straight wire and circular conductor), magnetic field in a solenoid, charge particles in magnetic fields. Magnetic Flux, magnetic force. Gauss law in magnetism. **Electromagnetic induction:** motion of a conductor in a magnetic field, Faraday's law, self-inductance, mutual inductance. **Magnetic properties of materials:** paramagnetic, diamagnetic, magnetization.	14
3.	**Alterning currents:** resistance, capacitance, inductance in AC circuits, the RLC series circuits, series resonance and quality factor. *topic in yellow had been covered in phys 111 as well	14
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Midterm examination	Approx. 6	15%
2.	Second Midterm examination	Approx. 12	15%
3.	Assignments, Quiz	Weekly	20%
4.	Class Attendance, In-class discussion	Every other week	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	Final examination	From 16 to 18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	الكهربية والمغناطيسية ، تأليف: محمد علي آل عيسى - الناشر: جامعة الملك سعود Elements of Electromagnetics; M. N. O. Sadiku, 2nd Edition, Oxford University Press.
Supportive References	Fundamentals of Physics, 10th Edition, David Halliday, Robert Resnick, Jearl Walker, John Wiley & Sons.
Electronic Materials	None
Other Learning Materials	Internet sites relevant to the course

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom which accommodates 25 students.
Technology equipment (projector, smart board, software)	Whiteboard and Smart board
Other equipment (depending on the nature of the specialty)	Not applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students\ Peer Reviewer	Indirect \ direct
Effectiveness of students assessment	Students- Faculty	Direct
Quality of learning resources	students	Indirect
The extent to which CLOs have been achieved	Faculty	Indirect
Other	None	None

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	6th (1st term/1445)
DATE	28/04/1445