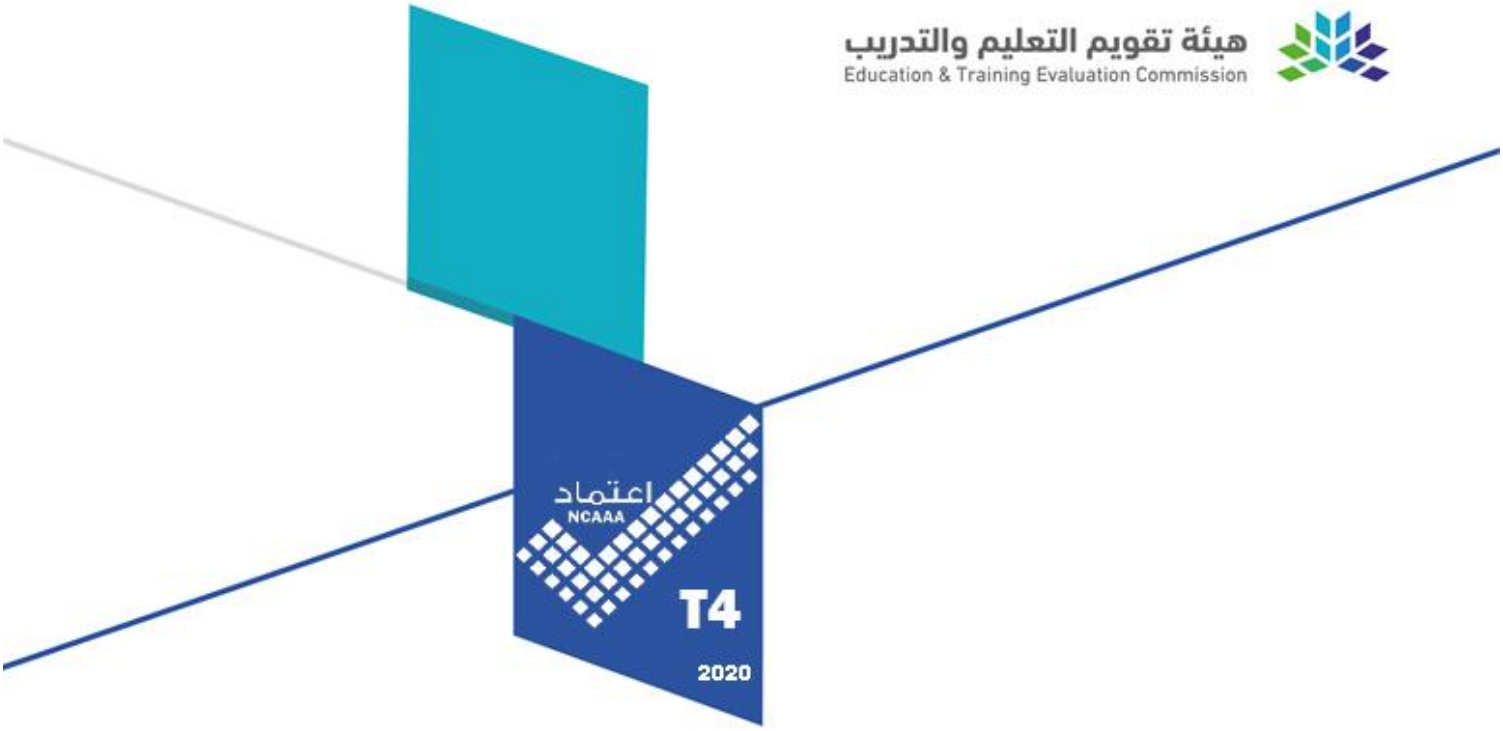
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Electricity and Magnetism
Course Code:	**231 Phys-4**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Jazan University**

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level 3/ Year 2
4. Pre-requisites for this course (if any)**: NIL**
5. Co-requisites for this course (if any)**: NIL**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**42**	**57 %**
2	**Blended**	**8**	**10 %**
3	**E-learning**		
4	**Distance learning**		
5	**Other**	**25**	**33 %**

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**45**
2	**Laboratory/Studio**	**30**
3	**Tutorial**	**--**
4	**Others** (specify)	**--**
	Total	**75**

B. Course Objectives and Learning Outcomes

1. Course Description

This course discusses basic concepts in some topics of electricity and magnetism. The topics includes; electrostatic charges, Coulomb's law, electric field, Gauss's law and its applications, electrostatic potential, capacitance and dielectrics, magnetic forces, magnetic field and its applications, and electromagnetic induction.

2. Course Main Objective

This course is designed to provide students with the following concepts:

- The concepts of electrostatic charges, electrostatic field, electrostatic potential, capacitance and dielectrics, magnetic forces, magnetic field, and electromagnetic induction.
- Coulomb's law, Gauss's law, Biot-Savart law, Ampere's law, Faraday's law and Lenz's law.
- Solving problems relating to the above topics.
- Laboratory experiments to understand the related concepts.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Define**: conductors, electric force, electric field, electric dipole, electric flux, electric potential, electrical potential energy and Equipotential surfaces, capacitance, Dielectric materials, magnetic field and magnetic flux.	**PLO 1.1**
1.2	**State:** Coulomb's law, Gauss's law of electric field, Gauss's law of magnetic field Biot-Savart law, Ampere's law, Faraday's law and Lenz's law.	**PLO 1.1**
1.3	**Describe** electric field of discrete and continuous charge distribution, electric potential of a group of charges and continuous charge distribution, equipotential surfaces, capacitance and dielectrics, electric dipole in a uniform electric field, types of capacitors, combinations and energy stored in capacitors, magnetic forces, magnetic fields and sources, a magnetic materials, electromagnetic induction and their applications, motional emf, Maxwell's equations.	**PLO 1.2**
2	**Skills :**	
2.1	**Solve**: problems relating to: electric forces, electric fields, electric potentials, capacitance and dielectrics, magnetic forces, magnetic fields and electromagnetic induction.	**PLO2.1**
2.2	**Derive** expressions for: the electric fields due to continuous charge distribution, the electric field inside and outside a charged sphere, capacitance of different types of capacitors, the torque induced in a current loop in a uniform magnetic field, the magnetic field in current carrying wires inside and outside, the mutual magnetic forces due two parallel wires,	**PLO2.2**
2.3	**Perform:** some experiments to justify and prove different phenomena related to the course contents.	**PLO2.3**
2.4	**Develop** competencies in communication, critical thinking and reporting during lab work.	**PLO2.4**
3	**Values:**	

CLOs		Aligned PLOs
3.1	**Demonstrate** abilities to work in groups and bear individual responsibility during lab work, interactive discussion and group assignments.	**PLO3.1**
3.2	**Show** awareness of safety for own and others when dealing with lab equipment's	**PLO3.3**

C. Course Content

Part I: Theory Part:

No	List of Topics	Contact Hours
1	**Electric Fields**: Properties of electric charges, Coulomb's law, electric field, electric field of a continuous charge distribution, electric field lines, motion of charged particles in a uniform electric field.	9
2	**Gauss's Law:** Electric flux, Gauss's law, application of Gauss's law to various charge distributions, Conductors in electrostatic equilibrium.	6
3	- **Electric Potential:** Potential difference and electric potential, potential difference in a uniform electric field, electric potential and potential energy due to point charges, obtaining the value of electric field from the electric potential, electric potential due to continuous charge distributions.	6
4	- **Capacitance and Dielectrics:** Definition of capacitance, calculating capacitance, combinations of capacitors, energy stored in charged capacitor, capacitors with dielectrics, an atomic description of dielectrics.	6
5	- **Magnetic Fields:** magnetic fields and forces, magnetic forces acting on a current carrying conductor, torque in a current loop in a uniform magnetic field, motion of charged particle in a uniform magnetic field.	3
6	- **Sources of the Magnetic Field:** Biot–Savart law, magnetic forces between two parallel conductors, Ampere's law, magnetic field of a solenoid, magnetic flux, Gauss's law in magnetism, magnetism in matter.	9
7	**Faraday's Law:** Faraday's law of induction, motional emf, Lenz law, generators and motors, Maxwell's equations.	6
Total		45

Experimental Part:

No	List of Topics	Contact Hours
1	Determination of the specific resistance of a wire using Meter Bridge .	2
2	Determination of the specific resistance of a conducting wire using Ohm's law.	2
3	Determination of the internal resistance of a battery using potentiometer .	2
4	Determination of the internal resistance of a voltmeter.	2
5	Determination of a low resistance using a standard resistance.	2
6	Determination of the capacitance of unknown capacitors by discharging method	2
7	Capacitance of capacitors in series and parallel combinations .	2
8	Magnetic force acting on a current carrying conductor.	2
9	Magnetic field of a current carrying solenoid.	2
10	Determination the horizontal component of earth's magnetic field using tangent galvanometer.	2

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	**Define**: conductors, electric force, electric field, electric dipole, electric flux, electric potential, electrical potential energy and Equipotential surfaces, capacitance, magnetic field and magnetic flux.	Lectures, blackboard and diagram illustration, group discussion, Interactive illustrations-Student contribution	**Direct** (formative and summative): In class interactive questioning, quizzes, written midterms exams and final exams **Indirect:** student survey
1.2	**State:** Coulomb's law, Gauss's law, Biot-Savart law, Ampere's law, Faraday's law and Lenz's law.	Lectures, blackboard and diagram illustration, group discussion, Interactive illustrations-Student contribution	**Direct** (formative and summative): In class interactive questioning, quizzes, written midterms exams and final exams. **Indirect:** student survey
1.3	**Describe** electric field of discrete and continuous charge distribution, electric potential of a group of charges and continuous charge distribution, equipotential surfaces, capacitance and dielectrics, electric dipole in a uniform electric field, types of capacitors, combinations and energy stored in capacitors, magnetic forces, magnetic fields and sources, a magnetic materials, electromagnetic induction and their applications, motional emf, Maxwell's equations.	Lectures, blackboard and diagram illustration, group discussion, Interactive illustrations-Student contribution	**Direct** (formative and summative): In class interactive questioning, quizzes, written midterms exams and final exams **Indirect:** student survey
2.0	**Skills**		
2.1	**Solve**: problems relating to: electric forces, electric fields, electric potentials, capacitance and dielectrics, magnetic forces, magnetic fields and electromagnetic induction.	Lectures, blackboard and visualization, brain storming, group and interactive discussion, Interactive illustration – Problem based learning	**Direct** (formative and summative): In class interactive questioning, quizzes, written midterm exams and final exams **Indirect**: student survey
2.2	**Derive** expressions for: the electric fields due to continuous charge distribution, the electric field inside	Lectures, blackboard and visualization, brain storming, group and	**Direct** (formative and summative): In class interactive

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	and outside a charged sphere, capacitance of different types of capacitors, the torque induced in a current loop in a uniform magnetic field, the magnetic field in current carrying wires inside and outside, the mutual magnetic forces due two parallel wires,	interactive discussion, Interactive illustration – Problem based learning	questioning, quizzes, written midterm exams and final exams **Indirect**: student survey
2.3	**Perform:** some experiments to justify and prove different phenomena related to the course contents.	Hands on lab demonstrations- guided discussion – guided discovery	**Direct** (formative and summative): Evaluation of assignments, Step-by-step check of experiment assessment lab. interactive questioning, quizzes, written midterm exams and final exams **Indirect:** student survey
2.4	**Develop** competencies in communication, critical thinking and reporting during lab work.	Lectures, blackboard and visualization, brain storming, group and interactive discussion, Interactive illustration – Problem based learning.	**Direct** (formative and summative): In class interactive questioning, quizzes, written midterm exams and final exams **Indirect:** student survey
3.0	**Values**		
3.1	**Demonstrate** abilities to work in groups and bear individual responsibility during lab work, interactive discussion and group assignments.	Interactive and Group discussion, expository and discovery teaching	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey
3.2	**Show** awareness of safety for own and others when dealing with lab equipment's	Case study- interactive demonstration- guided discussion	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey
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2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	**Homework assignment- Contribution in interactive discussion**	**2**	**2 (2%)**
2	**Quiz 1**	**3**	**2 (2%)**
3	**First Mid-term exam**	**7**	**10 (10%)**

#	Assessment task*	Week Due	Percentage of Total Assessment Score
4	Homework assignment- Contribution in interactive discussion	8	2 (2%)
5	Quiz 2	9	2 (2%)
6	Second mid-term exam	11	10 (10%)
7	Homework assignment- Contribution in interactive discussion- Group work-essay or Project discussion	12	2 (2%)
8	Laboratory Exam	14	20 (20%)
9	Final Exam	16	50 (50%)

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Each group of students is assigned to a staff member who will be available for help and academic guidance office hours at specific 2hours on daily basis.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Physics for Scientists& Engineers with Modern Physics; 7th edition, Serway, Saunders Golden Sunburst Series, 2007.
Essential References Materials	- University Physics; H. Young and R. Freedman, Addison-Wesley Publishing Company, Inc., 11th edition, 2004. - Fundamentals of Physics; Halliday, Resnik and Walker, John Wiley and Sons Inc., 2007. - Electricity and magnetism, Berkeley Physics Course Volume 2, Edward M. Purcell 1990.
Electronic Materials	**http://ocw.mit.edu/courses/physics/** **http://www.physics.org/explore.asp** **http://www.wikipedia.org/**
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Class room- if possible room for interactive discussion (round table)
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show- smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Equipment to perform lab. experiments as per the Lab. manual.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students, Peer and program leader	Indirect (CES)- Indirect peer evaluation
Assessment	Students, Program assessment committee	Direct/ Indirect
Extent of achievement of course learning outcomes	Instructor	Direct/Indirect
Quality of learning resources	Students, Faculty members	Indirect
Effectiveness of teaching	Students, Peer and program leader	Indirect (CES)- Indirect peer evaluation

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	**Department council**
Reference No.	**8**
Date	**16/4/1442**