هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**Electricity and Magnetism**
Course Code:	**231 Phys**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Jazan University**
Version:	**2022**
Last Revision Date:	**21 December 2022**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	4				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☐	Elective☐			
3. Level/year at which this course is offered:	**Level 5/ Year 2**				
4. Course General Description: This course discusses basic concepts in some topics of electricity and magnetism. The topics include; 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.					
5. Pre-requirements for this course (if any):101 Phys					
6. Co- requirements for this course (if any): NIL					
7. Course Main Objective(s): 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.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	60%
2.	E-learning		
3.	Hybrid ● Traditional classroom ● E-learning		
4.	Distance learning		
5.	Lab work	22	40%

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	33
2.	Laboratory/Studio	22
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	55

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	**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**	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 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**	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.	**PLO 1.2**	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	**PLO2.1**	Lectures, blackboard and visualization,	**Direct** (formative and summative): In

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	dielectrics, magnetic forces, magnetic fields and electromagnetic induction.		brainstorming, group and interactive discussion, Interactive illustration – Problem based learning.	class interactive questioning, quizzes, written midterm exam and final exams **Indirect**: student survey
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**	Lectures, blackboard, and visualization, brainstorming, group and interactive discussion, Interactive illustration – Problem based learning.	**Direct** (formative and summative): In class interactive questioning, quizzes, written midterm exam and final exams **Indirect**: student survey
2.3	**Perform:** some experiments to justify and prove different phenomena related to the course contents.	**PLO2.3**	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.	**PLO2.4**	Lectures, blackboard and visualization, brainstormin	**Direct** (formative and summative): In class interactive questioning,

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			g, group and interactive discussion, Interactive illustration – Problem based learning.	quizzes, written midterm exams and final exams **Indirect:** student survey
3.0	Values, autonomy, and responsibility			
3.1	**Demonstrate** abilities to work in groups and bear individual responsibility during lab work, interactive discussion, and group assignments.	**PLO3.1**	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 equipments.	**PLO3.3**	Case study-interactive demonstration- guided discussion	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey

C. Course Content

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.	6
2.	**Gauss's Law:** Electric flux, Gauss's law, application of Gauss's law to various charge distributions, Conductors in electrostatic equilibrium.	5
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.	4
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.	5

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 particles in a uniform magnetic field.	5
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.	5
7	**Faraday's Law:** Faraday's law of induction, motional emf, Lenz law, generators and motors, Maxwell's equations.	3
Total		33

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 of the horizontal component of earth's magnetic field using tangent galvanometer.	2
		20

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework assignment- Contribution in interactive discussion	3	2 (2%)
2.	Quiz 1	4	2.5 (2.5%)
3.	Homework assignment- Contribution in interactive discussion	5	2 (2%)
4	Quiz2	6	2 (2%)
5	Midterm exam	7	15 (15%)
6	Homework assignment- Contribution in interactive discussion-Group work-essay or Project discussion	7	2 (2%)
7	Quiz 3	9	2.5 (2.5%)
8	Laboratory Exam	11	20 (20%)
9	Quiz 4	11	2 (2%)
10	Final Exam	13	50 (50%)

*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	- 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 1990P
Supportive References	Physics for Scientists& Engineers with Modern Physics; 7th edition, Serway, Saunders Golden Sunburst Series, 2007.
Electronic Materials	http://ocw.mit.edu/courses/physics/ http://www.physics.org/explore.asp
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom- if possible, room for interactive discussion (round table)
Technology equipment (Projector, smart board, software)	Data show- smart board
Other equipment (Depending on the nature of the specialty)	Equipment to perform in the lab. experiments as per the Lab. manual.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader.	Indirect (CES)- Indirect peer evaluation
Effectiveness of students assessment	Students, Program assessment committee	Direct/ Indirect.
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Course Instructor	Direct/ Indirect
Other	Students, Peer and program leader	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	DEPARTMENT BOARD
REFERENCE NO.	PHYS2304
DATE	28/2/2023