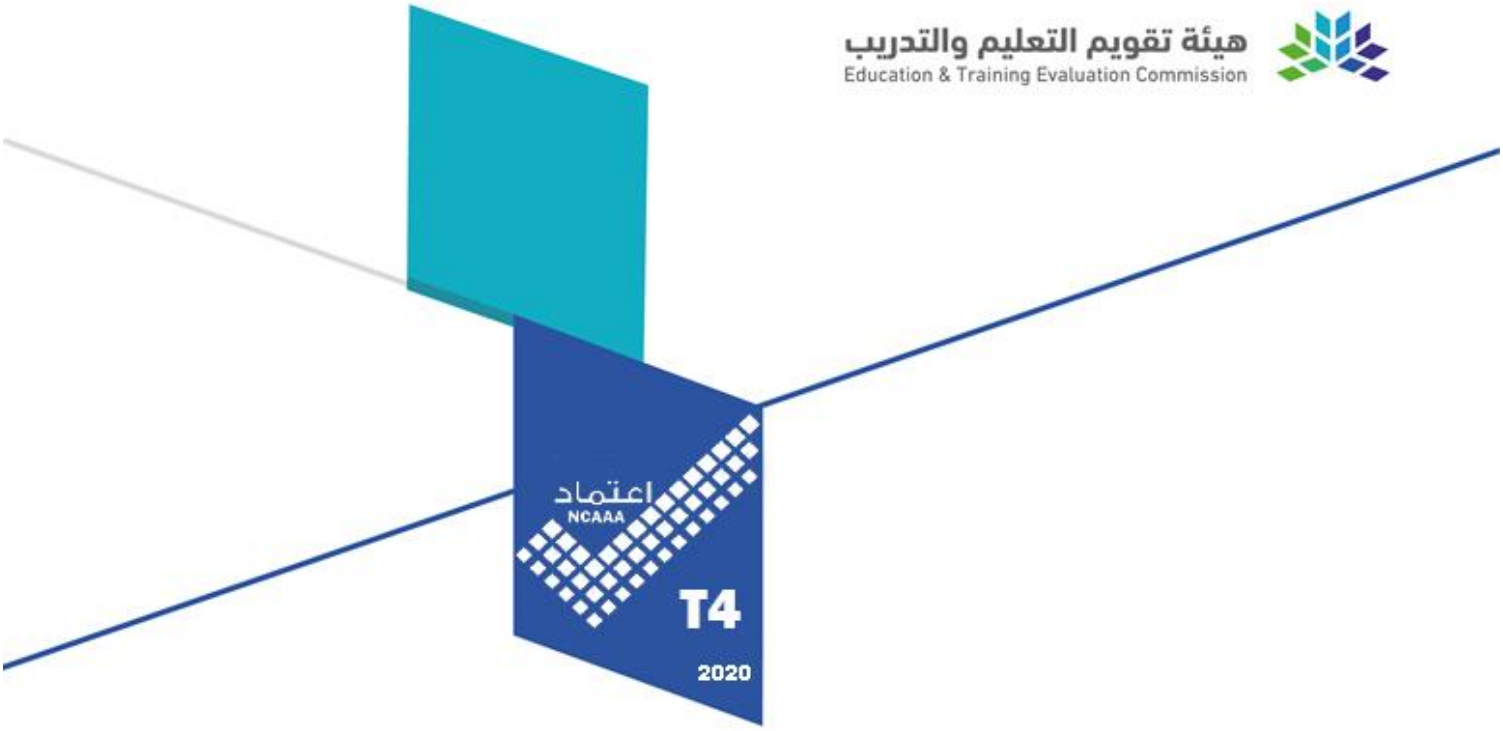
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Electricity and magnetism
Course Code:	2032103-4
Program:	Bachelor in Physics
Department:	Physics Department
College:	College of Science
Institution:	Taif University

Table of Contents

A. Course Identification

1. Credit hours:4
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 5th Level/ 2nd Year
4. Pre-requisites for this course (if any)**: None**
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	7	100%
2	**Blended**		-
3	**E-learning**		-
4	**Distance learning**		-
5	**Other**		-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	50
2	**Laboratory/Studio**	20
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	70

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers important parts in electricity and magnetism. Students will study electric field, electric flux, Gauss`s law and its applications. Capacitance and Dielectrics will be studied. Electromotive force, direct Current Circuits, Kirchhoff`s circuit rules and its applications will be covered. Magnetic fields and magnetic forces are also included. Finally, Faraday's law, electromotive force and some different types of AC circuits will be studied.

2. Course Main Objective

- Establishes a foundation in electricity and magnetism in preparation for more advanced courses.
- Introduces main topics theoretically and experimentally in electricity, magnetism and its electrics circuit’s applications.

- Recognizes the connection between electricity and magnetism and its applications.
- Gives an overview and understanding of basic physics, with moderate use of mathematical formalism in electricity and magnetism.
- Develop the skills of problem solving and practice of electricity, magnetism and related applications.
- Acquire the necessary skills of conducting experiments, data interpretation, and experimental reports preparation.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Define the basic concepts and theories of electric field, magnetic field, capacitance and dielectrics.	K2
1.2	Recognize the theories and methods for analysing DC and AC circuits with different structures and its applications.	K3
2	**Skills :**	
2.1	Solve problems of electric and magnetic fields, DC, AC electric circuits, and related topics by means of the fundamentals, concepts and theories.	S2
2.2	Analyse qualitatively and quantitatively experimental data of DC and AC electric circuits.	S4
3	**Values:**	
3.1	Communicate effectively within a group when performing activities, assignments and experiments.	V2
3.2	Act responsibly and be able to prepare a written scientific report	V3

C. Course Content

No	List of Topics	Contact Hours
1	**Unit 1: Electric field** - Electric field from a continuous charge distribution - Electric flux - Gauss's law - Calculation of electric field by Gauss's law	7
2	**Unit 2: Capacitance and Dielectrics** - Capacitance definition - Calculation of capacitance for types of capacitors - Stored electrostatic energy in a capacitor - Effect of dielectric on the capacitance	7
3	**Unit 3: Direct Current Circuits** - Electromotive force - Kirchhoff circuit rules and applications - Charging and discharging a capacitor through a resistor	7
4	**Unit 4: The Magnetic field** - Definition and units of magnetic field	7

	- Some properties of the magnetic field - Forces on isolated, moving charges in a magnetic field - Velocity selector and Mass spectrometer - Torque on a current loop in a uniform magnetic field	
5	**Unit 5: Sources of Magnetic field** - Biot-Savart Law - Force between two parallel wires - Ampere Law - Magnetic field of a Solenoid and Toroid - The flux of the magnetic field and Gauss's Law in Magnetism	7
6	**Unit 6: Induced electromotive force** - Faraday's law of induction - Lenz's principle - Inductance - Energy stored in a magnetic field - Electrical generators	7
7	**Unit 7: Alternating current circuits** - Ohmic resistor in an AC circuit - A capacitor in an AC circuit - An inductive coil in an AC circuit - rms voltage and rms current - Average power delivered by an AC source - RLC in an AC circuits - Resonance in RLC AC circuit	8
Part 2		
1	**Experiment 1:** Kirchhoff's Laws	2
2	**Experiment 2:** Voltage transformation with a transformer	2
3	**Experiment 3:** Determination of self-inductance of an inductive coil in a series RL AC circuit	2
4	**Experiment 4:** Determination of the capacitance of a capacitor in a series RC AC circuit	2
5	**Experiment 5:** Charging and discharging of capacitor	2
6	**Experiment 6:** Use of Oscilloscope in measurement of AC Voltage and Frequency	2
7	**Experiment 7:** Relationship between V_{pp}, V_m and V_{rms} in the calibration of Oscilloscope and/or potentiometer	2
8	**Experiment 8:** Tangent galvanometer	2
9	**Experiment 9:** Resonance RLC AC circuit	2
10	**Reports evaluation and practical exam**	2
Total		70

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 the basic concepts and theories of electric field, capacitance and dielectrics.	- Lecture - Discussion	Written exam
1.2	Recognize the theories and methods for analysing DC and AC circuits with different structures and its applications.	- Lecture - Discussion - Problem based strategy. - Brain storming sessions.	- Written exam - Lab reports - Lab exam
2.0	**Skills**		
2.1	Solve problems of electric and magnetic fields, DC, AC electric circuits, and related topics by means of the fundamentals, concepts and theories.	- Problem based strategy. - Brain storming sessions.	- Written exam including problem solving - Activities such as assignments and problem solving missions
2.2	Analyse qualitatively and quantitatively experimental data of DC and AC electric circuits.	- Practical - Cooperative Learning strategy.	- Lab reports - Lab exam
3.0	**Values**		
3.1	Communicate effectively within a group when performing activities, assignments and experiments.	- Lab work - Essays	- Lab reports - Lab exam - Essay evaluation
3.2	Act responsibly and be able to prepare a written scientific report	- Lab work - Discussions	- Indirect evaluation

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm exam	6th	20%
2	Activities (Quizzes)	Periodically	10%
3	Lab reports	Weekly/ 10th	20%
4	Final Lab Exam	10th	10%
5	Final exam	11th	40%

***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 faculty member is assigned a group of students for continuous academic advice during six office hours weekly (6 hrs./week).
- Also teaching staff are available for individual student consultations during office hours

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Raymond A. Serway and John W. Jewett, Jr., Physics for Scientists and Engineers with Modern Physics, 9th Edition, Publisher: Brooks/Cole, Print ISBN-13: ISBN: 978-1133954057, (2014).
Essential References Materials	Raymond A. Serway, Chris Vuille, College Physics, 10th Edition, Publisher: Cengage Learning, 978-1285761954, (2014).
Electronic Materials	Interactive simulations for science and math: https://phet.colorado.edu/
Other Learning Materials	CD associated with the text books (when available). Lecture notes and PowerPoints presentations prepared by the lecturer.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms • Electricity and magnetism physics laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	• Data show • Laptop • Smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student Feedback on Effectiveness of Teaching	Students	Indirect
Evaluation of Teaching	- Instructor - Program coordinator - Departmental council - Faculty council	Indirect
Improvement of Teaching	- Program leaders - Relevant committee	Indirect
Quality of learning resources	- Students - Instructor - Faculty	Indirect
Extent of achievement of course learning outcomes,	- Program leaders - Instructor	Direct
Course effectiveness and planning for improvement	- Program leaders - Instructor	Indirect

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 / Committee of academic development
Reference No.	
Date	October 2, 2022