هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electromagnetic Theory
Course Code:	2033205-3
Program:	Bachelor in Physics
Department:	Physics Department
College:	College of Science
Institution:	Taif University
Version:	3
Last Revision Date:	24 May 2022

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th level / 3th year)					
4. Course general Description:					
The course explores in details important parts in electromagnetism. Students will study varying electric field, varying electric flux, Gauss`s law and its applications. Capacitance and Dielectrics will be studied. Varying magnetic fields and magnetic forces are also included. Then, Faraday's law, Lenz rule and the Maxwell's equation are presented. Finally, the image method is introduced.					
5. Pre-requirements for this course (if any):					
Mathematical Physics (1) 2033102-3					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
Establishes in detail the mathematical foundation in electricity and magnetism. Introduces main topics such as electric field and flux, capacitors, magnetic fields and the magnetic forces, Faraday's law and electromagnetism, and its applications.					

2. Teaching mode (mark all that apply)

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

3. Contact Hours (based on the academic semester)

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

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

Code	Course Learning Outcomes	Aligned PLOs	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.1	Define the basic concepts and theories of constant and varying electric field, polarization and dielectrics.	K2	Lecture	Written exam
2.2	Recognize the theories and methods for analyzing problems electromagnetism with different structures.	K3	Lecture	Written exam
2.0	**Skills**			
2.1	Apply the main fundamental laws and theories of electromagnetism to solve problems of electric, magnetic fields and fluxes.	S2	Lecture Problem solving	Written exam Activities
2.2	Analyze qualitatively and quantitatively the distributions of static and dynamic electric charges.	S3	Lecture Problem solving	Written exam Activities
3.0	**Values, autonomy, and responsibility**			
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1	Discussion Self-learning	Activity Assignment
3.2	Communicate physics concepts of electricity and magnetism verbally, graphically, and/or in writing to prepare reports of different activities.		Discussion Group work	Activity Assignment

C. Course Content

No	List of Topics	Contact Hours
1.	Mathematical introduction - The three coordinate systems	3
2.	Some of the basic concepts that are used in electromagnetic	3
3.	Electrostatic force and Electric Field due to continuous distributions of the charge	3
4.	Capacity and Capacitance	3
5.	Gauss law - Electrostatic potential – dielectric media	3
6.	Ampere's law in the integral and differential - Lorentz force - magnetic materials	3
7.	Electric dipole – multi pole potentials – dipole potentials	3
8.	**Revision and Midterm exam 1**	
9.	Potential and moment of the Quadra pole – Magnetic multi pole	3
10.	The charge conservation and the continuity equation - electromagnetic induction	3
11.	Maxwell's equations	3
12.	Electromagnetic field potential - the electromagnetic field energy	3
13.	**Revision and Midterm exam 2**	
14.	Electrostatic energy for many charges system – La Grange function of the charged body in an electromagnetic field	3
15.	Planar electromagnetic waves in free space	3
16.	Polarization - theory Bonython to complex vectors field	3
17.	Plane waves in connected media	**3**
	Total	**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Activities	Periodically	20%
2.	Periodic exam 1	8^{th} -9^{th}	15%
3.	Periodic exam 2	13^{th} -14^{th}	15%
4.	Final exam	16^{th} -17^{th}	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	David J. Griffiths, Introduction to Electrodynamics, 4th Edition, Publisher: Cambridge University Press, ISBN-13: 978-1108420419, ISBN-10: 1108420419, (2017).
Supportive References	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). 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	Lecture notes and PowerPoint presentations prepared by the lecturer.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	Laptop

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Faculty Program coordinator	Direct
Quality of learning resources	Students Faculty	Indirect
The extent to which CLOs have been achieved	Faculty Program coordinator	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PHYSICS DEPARTMENT COUNCIL
REFERENCE NO.	NO. 4-45
DATE	27/09/2023 (12/03/1445)

قسم الفيزياء
Physics Department
TU
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