هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Electromagnetic Theory**
Course Code:	**2033205-3**
Program:	**Bachelor in Physics**
Department:	**Physics Department**
College:	**College of Science**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 10th level / 4th year
4. Pre-requisites for this course (if any)**: Mathematical Physics (1) 2033102-3**
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**	4	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	40
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course 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 Maxwells equation are presented. Finally, the image method is introduced.

2. Course Main Objective

Establishes in detail the mathematical foundation in electricity and magnetism in the light of electromagnetism. Introduces main topics such as electric field and flux, capacitors, magnetic fields and the magnetic forces, Faraday’s law and electromagnetism, and its applications.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding:**	
1.1	Define the basic concepts and theories of constant and varying electric field, polarization and dielectrics.	K2
1.2	Recognize the theories and methods for analyzing problems electromagnetism with different structures.	K3
2	**Skills:**	
2.1	Apply the main fundamental laws and theories of electromagnetism to solve problems of electric, magnetic fields and fluxes.	S2
2.2	Analyze qualitatively and quantitatively the distributions of static and dynamic electric charges.	S3
3	**Values:**	
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1
3.2	Communicate physics concepts of electricity and magnetism verbally, graphically, and/or in writing to prepare reports of different activities.	

C. Course Content

No	List of Topics	Contact Hours
1	Some of the basic concepts that are used in electromagnetic	**2**
2	Electrostatic force resulting from the continuous distributions of the charge and Field intensity due to continuous distributions of the charge	**3**
3	Gauss law - Electrostatic potential – dielectric media	**3**
4	Ampere's law in the integral and differential - Lorentz force - magnetic materials	**3**
5	Electric dipole – multi pole potentials – dipole potentials	**3**
6	Potential and moment of the Quadra pole – Magnetic multi pole	**3**
7	**Revision and Midterm exam**	**2**
8	The charge conservation and the continuity equation - electromagnetic induction	**3**
9	Maxwell modified to Ampere's law - Maxwell's equations	**3**
10	Maxwell's equations	**3**
11	Functions electromagnetic field potential - the electromagnetic field energy	**3**
12	Electrostatic energy for many charges system – La Grange function of the charged body in an electromagnetic field	**3**
13	Planar electromagnetic waves in free space	**2**
14	Polarization - theory Bonython to complex vectors field	**2**
15	Plane waves in connected media	**2**
Total		40

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 constant and varying electric field, polarization and dielectrics.	Lecture	Discussion
1.2	Recognize the theories and methods for analyzing electrodynamics problems with different structures.	Lecture	Discussion
2.0	**Skills**		
2.1	Apply the main fundamental laws and theories of electromagnetism to solve problems of electric, magnetic fields and fluxes.	Problem solving	Written exam Activities
2.2	Analyze qualitatively and quantitatively the distributions of static and dynamic electric charges.	Problem solving	Written exam Activities
3.0	**Values**		
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	Home work	Reports
3.2	Communicate physics concepts of electricity and magnetism verbally, graphically, and/or in writing to prepare reports of different activities.	Work groups	Reports

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Activities	Periodically	10%
2	Midterm exam	6^{th}	30%
3	Short exam	9^{th}	10%
4	Final exam	12^{th}	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 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	David J. Griffiths, Introduction to Electrodynamics, 4th Edition, Publisher: Cambridge University Press, ISBN-13: 978-1108420419, ISBN-10: 1108420419, (2017).
Essential References Materials	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	CD associated with the textbooks (when available). Lecture notes and PowerPoints presentations prepared by the lecturer.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
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)	Non

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student Feedback on Effectiveness of Teaching	· Students	· Indirect
Evaluation of Teaching	· Instructor	· Indirect
Improvement of Teaching	· Program leaders · Relevant committee	· Direct
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	
Reference No.	
Date	October 2, 2022