هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Electromagnetism 3**
Course Code:	**PHY4306**
Program:	**Physics**
Department:	**Physics**
College:	**Applied Sciences**
Institution:	**Umm Al-Qura 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: Level 10th /4th year
4. Pre-requisites for this course (if any): **Electromagnetism 2**
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

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

B. Course Objectives and Learning Outcomes

1. Course Description

This course is extension of Electromagnetism 1 and 2. The course contains Maxwell's equations and their applications, electromagnetic waves, propagation of the electromagnetic wave in different media.

2. Course Main Objective

The student will be able to

- Apply Maxwell's equations for solving electromagnetic problems.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and Understanding	

CLOs		Aligned PLOs
1.1	Define the physical quantities related to the electromagnetic waves.	K1
1.2	Describe the concepts related to the electromagnetic waves using the mathematical formula.	K1
2	**Skills :**	
2.1	Apply Maxwell's equations to solve physics problems related to the electromagnetic waves.	S1
2.2	Explain the physical formulas related to the electromagnetic waves.	S2
3	**Values:**	
3.1	Work effectively and responsibly in teamwork.	V2

C. Course Content

No	List of Topics	Contact Hours
1	**Maxwell's Equation's and Electromagnetic Waves** • The generalization of Ampere's law, Displacement Current. • Maxwell's equations. • Electromagnetic energy. • The wave equation. • Plane monochromatic waves in nonconducting media. • Plane monochromatic waves in conducting media. • The spherical wave. • The wave equation with sources.	10
2	**Application of Maxwell's Equation's** • Boundary conditions. • Refraction and reflection at the boundary of two non-conducting media. Normal incidence. • Reflection and refraction at boundary between two conducting media. • The reflection at a conducting pane (Normal incidence). • Propagation between parallel conducting plates • Waveguides • Cavity resonators • Radiation from an oscillating dipole • Radiation from a half-wave antenna	10
3	**Electrodynamics** • The Lienard-Wiechert potentials. • The field of a uniformly moving point charge • Radiation from an accelerated point charge • Radiation fields for small velocities	10
	Total	30

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 physical quantities related to the electromagnetic waves.	1. Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: Board, Power point. 4. Discussions 5. Brain storming Start each chapter by general idea and the benefit of it.	- Solve some examples - Discussions during the lectures Exams: a) Quizzes. b) Midterm exams. c) Final exam.
1.2	Describe the concepts related to the electromagnetic waves using the mathematical formula.		
2.0	**Skills**		
2.1	Apply Maxwell's equation to solve physics problems related to the electromagnetic waves.	1. Preparing main outlines for teaching. 2. Following some proofs. 3. Define duties for each chapter 4. Encourage student to look up for information in different references.	1. Exams (Midterm, final) 2. Asking about physical laws previously taught 3. Writing reports on selected parts of the course. 4. Discussions of how to simplify or analyze some phenomena
2.2	Explain the physical formulas related to the electromagnetic waves.		
3.0	**Values**		
3.1	Work effectively and responsibly in teamwork.	● Organize the students in a small groups (teamwork). ● Give students tasks of duties as a small project.	● Evaluate the scientific reports. ● Discussing the reports with each teamwork. ● Evaluate the efforts of each student in preparing the report.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	8th	30%
2	Homework's & Quizzes & Reports	All weeks	20 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Final Exam	End of the semester	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 student will supervise by academic adviser in physics department and timetable for academic advice were given to the student each semester. (4 hrs per week)

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Foundations of Electromagnetic Theory by John R. Reitz, and Frederick J. Milford (1960).
Essential References Materials	
Electronic Materials	
Other Learning Materials	• Introduction to Electrodynamics by David J. Griffiths, 4th edition. • Modern Electrodynamics by Andrew Zangwill, (2013). • Electromagnetic Fields by Roald K. Wangsness, 2nd edition.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	- Black Board - Data show
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
Effectiveness of teaching Strategies	Students	Questionnaire
Effectiveness of student assessment	Instructor	Exams
Extent of achievement of course learning outcomes	Instructor	Course report
Quality of learning resources	Instructor	Course report

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	