هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	Electromagnetism II
Course Code:	PHYS 323
Program:	B.Sc. in Physics
Department:	Department of Physics and astronomy
College:	College of Science
Institution:	King Saud University
Version:	2.0.0
Last Revision Date:	Sep 2023

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	**3(0+0+3)**				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	fifth level / third year.				
4. Course general Description The course aims to establish the theoretical grounds of electromagnetism for the students. The course covers the basic concepts of vector calculus: gradient, divergence, and curl. Stokes' and Green's theorems. Electrostatics in free space, conductors. It also covers Ampere's law and the magnetic field, Maxwell equations in differential and integral forms. It also covers solutions to Maxwell equations in vacuum and the propagation of electromagnetic radiation.					
5. Pre-requirements for this course (if any): PHYS 221					
6. Co- requirements for this course (if any):					
7. Course Main Objective(s) This course aims to enable the student to comprehend the theoretical principles of electromagnetism, to become familiar with Maxwell's equations of electromagnetism, and with the propagation of electromagnetic radiation in vacuum					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100%
2.	E-learning	0	0
3.	Hybrid • Traditional classroom • E-learning	0	0
4.	Distance learning	0	0

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
	Total	45

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	Explain the fundamentals of vector analysis, differential calculus, and integral calculus.	K1	• Give extensive examples during lecture. • Give problem sheets to be discussed during lecture.	• Hold Class discussion, tutorial sessions. • Give quizzes, mid-term exam and final exam.
1.2	Use the fundamental method of vector analysis to solve the electrostatics problems.	K2		
1.3	Explain integral calculus to describe Delta Dirac function.	K3		
2.0	Skills			
2.1	Evaluate the effect of electrostatics and magnetostatics in electromagnetic waves.	S1	• Give extensive examples during lecture • Give problem sheets to be discussed during lecture and labs. • assignments. • Discussions in the classes	• Hold Class discussion, tutorial and lab sessions. • Give quizzes, mid-term exam and final exam.
2.2	Analyze the Electrodynamics.	S2		
2.3	Use the different methods of derivative and integration to solve fundamental theorems	S3		
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Work in a team and acknowledge others' work.	V1	• Homework assignments.	Hold Class discussion

C. Course Content

No	List of Topics	Contact Hours
1.	**Vector Calculus in different coordinate systems:** sections 1.1, 1.2, 1.3, 1.4 and 1.5)	8
2.	**Electrostatics in free space and in conductors:** sections 2.1, 2.2 (except 2.2.3) , 2.3 (except 2.3.5), 2.4 and 2.5 (except 2.5.3 and 2.5.4)	9
3.	**The electrostatic potential:** subsections 3.1.1, 3.1.2, 3.4.1, 3.4.2	3
4.	**Magnetostatics in free space:** sections 5.1, 5.2, 5.3 and 5.4 (except 5.4.2 and 5.4.3)	9
5.	**Maxwell's Equations and Electrodynamics:** sections 7.1, 7.2, 7.3 except (7.3.5 and 7.3.6)	9
6.	**Conservation Laws:** section 8.1 and subsection 8.2.1	3
7	**Electromagnetic waves:** sections 9.2 and subsections 9.3.1 and 9.4.1	4
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Midterm examination	Approx. 6	20%
2.	Second Midterm examination	Approx. 12	20%
3.	Homework and quizzes	Biweekly	20%
4.	Final examination	From 16 to 18	40%

*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	Introduction to electrodynamics (by David Griffiths).
Supportive References	Electricity and Magnetism (by Edward M. Purcell and David Morin)

Electronic Materials	None
Other Learning Materials	Internet sites relevant to the course

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom which accommodates 25 students.
Technology equipment (projector, smart board, software)	Whiteboard and Smart board
Other equipment (depending on the nature of the specialty)	Not applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students\ Peer Reviewer	Indirect \ direct
Effectiveness of students assessment	Students- Faculty	Direct
Quality of learning resources	students	Indirect
The extent to which CLOs have been achieved	Faculty	Indirect
Other	None	None

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	5th (1st term/1445)
DATE	13/04/1445