هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TPG-153

Course Specification

(Postgraduate)

Course Title:	Field Theory
Course Code:	202605-3
Program:	Master of applied mathematics
Department:	Mathematics and Statistics
College:	Science
Institution:	Taif university
Version:	1
Last Revision Date:	20/10/2023

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: Level 2/First Year					
4. Course general Description:					
Vectors analysis in the different coordinates-Stoke's theorem–Gauss's theorem- Gravitational field and the potential field-Solid angle–Solved problems- Electric field-Gauss's flux theorem–Equipotential surface – Dipole –General solution of Laplace's equation in the different coordinates – Dielectrics-Fitzgerald electric vector potential–Magnetic field – The coupling of potential energy of two magnetic dipole of momentum- Intensity of magnetization–Poisson's distribution–Induced magnetism- Magnetic induction – Magnetic vector potential. Maxwell's equations and the charge continuity equation-The wave equation- The Helmholtz equation.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					

The student will be taught as follows:

1. **Learn the difficult subject of electromagnetic field theory by presenting many worked examples emphasizing physical processes, devices, and models.**
2. **knowledge of classical field theory, including specific field theories that occur in our description of Nature**

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	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**	NA
3.	**Field**	NA
4.	**Tutorial**	NA
5.	**Others (specify)……**	NA
	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	Recognize the electric field and its distribution problems.	K1	Lectures, group discussion `	Exams, Quizzes, Assignments
1.2	Describe the gravitational fields as a consequence of curvature in spacetime and apply them to problems within astrophysics.	K2	Lectures, group discussion	Exams, Quizzes, Assignments
2.0	Skills			
2.1	Explain phenomena in relativistic mechanics and electrodynamics the framework of covariant Lorentz transformation.	S3	Lectures, group discussion	Exams, Quizzes, Assignments, report
2.2	Apply the Lagrangian formalism to derive equations for fundamental classical fields	S1	Lectures, group discussion	Exams, Quizzes, Assignments, report
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Participate effectively within groups and independently.	V1	Lectures, group discussion	Exams, Quizzes, Assignments, report
3.2	Accept critical thinking, communication skills and mathematical techniques in solving many problems in other disciplines	V3	Lectures, group discussion	Exams, Quizzes, Assignments, report

C. Course Content:

No	List of Topics	Contact Hours
1.	Vectors analysis in the different coordinates	6
2.	Stoke's theorem–Gauss's theorem- Gravitational field	3
3.	The potential field-Solid angle–Solved problems	6
4.	Electric field-Gauss's flux theorem–Equipotential surface – Dipole	3
5.	General solution of Laplace's equation in the different coordinates	3
6.	Dielectrics-Fitzgerald electric vector potential	6
7.	The coupling of potential energy of two magnetic dipole of momentum	3
8.	Intensity of magnetization–Poisson's distribution	3
9.	Induced magnetism- Magnetic induction – Magnetic vector potential	3
10.	Maxwell's equations and the charge continuity equation-The wave equation	6
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Quizzes and HomeWorks**	**Continues**	**10 %**
2.	**Midterm exam**	**8^{th} -9^{th}**	**20 %**
3.	**Final exam**	**16^{th}**	**70%**

*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	MARKUS ZAHN, ELECTROMAGNETIC FIELD THEORY, KRIEGER PUBLISHING COMPANY Malabar, Florida, 2003

Supportive References	Joel Franklin, Classical Field Theory Cambridge University Press, 2017
Electronic Materials	Journal of modern optics, Optics communication.
Other Learning Materials	https://www.cambridge.org/sa/academic/subjects/physics/theoretical-physics-and-mathematical-physics/classical-field-theory?format=HB

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (Projector, smart board, software)	Data show, Blackboard, Maple and MATLAB software
Other equipment (Depending on the nature of the specialty)	Wi-Fi internet connections

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Indirect**
Effectiveness of students assessment	**Students**	**Indirect**
Quality of learning resources	**Students**	**Indirect**
The extent to which CLOs have been achieved	**Peer reviewer**	**Direct**
Other		

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

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Mathematics and Statistics**
REFERENCE NO.	
DATE	**20/10/2023**

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