هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Modern Physics
Course Code:	PHYS 353
Program:	B.Sc. in Physics
Department:	Physics and Astronomy
College:	Science
Institution:	King Saud University
Version:	TP135
Last Revision Date:	16 September 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3(3+ 0 +0)					
2. Course type					
A.	☐ University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5 level/3 year)					
4. Course general Description:					

The subject of modern physics is one of the most important subjects that a physics student must be familiar with its principles.
Modern physics is a branch of physics that deals with the post-Newtonian concepts in the world of physics. It is based on the two major breakthroughs of the twentieth century: Relativity and Quantum Mechanics. Quantum effects typically involve distances related to atoms. On the other hand, relativistic effects typically involve velocities compared to the speed of light.
The course presents some experimental physical observations that Newtonian concepts could not explain, but they could be understood according to modern concepts.

5. Pre-requirements for this course (if any)**:**

Phys 230

7. Course Main Objective(s):

1. The student understands the concept of special relativity, and can measure physical quantities in frames of reference that move relative to each other at very high speeds.
2. To understand the particle nature of electromagnetic waves and can therefore explain some natural phenomena and related experimental results.
3. To understands the wave nature of physical particles and the impact of this on interpreting some experimental observations and using them in many modern applications.
4. To student understands the Schrödinger equation and its importance in deep understanding the microscopic behavior of matter and interpreting physical observations.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	x	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	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	To outline the concepts of special relativity	K1	Lecture, Smart Board	Exams, QZs, Presentation and homework

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	To describe the concepts of quantum physics.	K2	Lecture, Smart Board	Exams, QZs, Presentation and homework
2.0	**Skills**			
2.1	Calculate the dynamical properties of objects moving close to the speed of light.	S1	Lecture, Smart Board	Exams, QZs, Presentation and homework
2.2	Analyze quantum mechanical systems using Schrodinger equation**.**	S2	Lecture, Smart Board	Exams, QZs, Presentation and homework
3.0	**Values, autonomy, and responsibility**			
3.1	Apply special relativity and quantum mechanics principles to study physical systems.	V1	Lecture, Smart Board	Exams, QZs, Presentation and homework

C. Course Content

No	List of Topics	Contact Hours
	Classical relativity, Michaelson-Morley experiment, Postulates of special relativity, 1 3 Lorentz transformations, the consequences of special relativity**.**	**12**
	The photoelectric effect, The photon. THERMAL RADIATION (Black Body Radiation)	**6**
3.	De Broglie waves, the uncertainty principle, wave packets. Probabilities and randomness.	**9**
4.	Wave at boundaries, trapping particles, the Schrodinger equation, applications of Schrodinger equation, the harmonic oscillator	**9**
5.	The basic properties of the atom, Thomson model, Rutherford experiment, spectral lines, Bohr model, Hydrogen-like atom, THE FRANCK-HERTZ EXPERIMENT .	**9**

Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Mid Term Exam.(1)	5	20%
2	Mid Term Exam.(2)	10	20%
3	Quizzes	Throughout	10%
4	Homework	Throughout	10%
5	Final	17	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	Modern Physics, Kenneth S. Krane, Third Edition, 2012, Wiley
Supportive References	Modern Physics, John Morrison, Second Edition, 2015, Academic Press
Electronic Materials	
Other Learning Materials	**Modern Physics Lab. Visit**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture hall for about 30 students
Technology equipment	Computing resources (AV, data show, Smart Board, software, etc.) Smart Board

Items	Resources
(projector, smart board, software)	
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty	Direct
Effectiveness of Students assessment	Chairman	Indirect
Quality of learning resources	Quality Vice deanship	Indirect
The extent to which CLOs have been achieved	Dept. Quality Committee	Indirect
Other		

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

G. Specification Approval

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