



Course Specifications

Course Title:	Modern physics 1
Course Code:	PHY2401
Program:	BSc
Department:	Physics
College:	Applied Sciences
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 4hrs
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 4/ 2 nd years
4. Pre-requisites for this course (if any): General physics 3
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	40 Hours	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 Hours
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	40 Hours

B. Course Objectives and Learning Outcomes

1. Course Description

The course will cover the principles of Modern physics, such as Relativity, Particle Properties of Waves, Wave Properties of Particles and Atomic Structure.

This



2. Course Main Objective

1. Define the main properties of modern physics
2. Understand that all motion is relative
3. Explain how Energy and Momentum fit together in relativity
4. Understand that coupled electric and magnetic oscillations that move with the speed of light and exhibit typical wave behavior
5. Explain the origin of Blackbody Radiation by the quantum theory of light.
6. Understand how Energy and Momentum fit together in relativity
7. Show that the energies of electrons liberated by light depend on the frequency of incident light.
8. Write a general formula for waves.
9. Explain that a photon is emitted when an electron jumps from one energy level to a lower level.
10. Understand how atoms absorb and emit energy.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Define relativity.	K1-I
1.2	Explain the wave particle duality .	K2-I
1.3	Describe the atomic structure.	K2-I
1.4		
2	Skills :	
2.1	Estimate relativistic quantities	S1-P
2.2	Explain atomic radiation and its interaction with matter	S2-P
2.3		
3	Values:	
3.1	Collaborate with the others to resolve problems.	V1-I
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	Relativity Special Relativity, Time Dilation, Doppler Effect, Length Contraction, Twin Paradox, Electricity and Magnetism, Relativistic Momentum, Mass and Energy, Energy and Momentum and General Relativity.	10
2	Particle Properties of Waves	10



	Electromagnetic Waves, Blackbody Radiation, The photoelectric effect, X-Rays, X-Ray Diffraction, Compton Effect, Pair Production and Photons and Gravity.	
3	Wave Properties of Particles De Broglie waves, Describing a Wave, Phase and Group Velocities, Particle Diffraction, Particle in a Box, Uncertainty Principle I, Uncertainty Principle II and Applying the Uncertainty Principle.	10
4	Atomic Structure The Nuclear Atom, Electron Orbits, Atomic Spectra, The Bohr Atom, Energy Levels and Spectra, Correspondence Principle, Nuclear Motion, Atomic Excitation and The Laser	10
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 relativity.	<ul style="list-style-type: none"> - Demonstrating the basic principles through lectures. - Discussing phenomena with illustrating pictures and diagrams - Discussions 	1-Solve some examples during the lecture. 2-Exams: a) Quizzes b) Mid-term exam c) Final Exam d) Home work
1.2	Describe the particle properties of waves.		
1.3	Describe the wave properties of particles.		
1.4	Describe the atomic structure.		
2.0	Skills		
2.1	Apply physical principles on physical phenomena.	<ul style="list-style-type: none"> - Preparing main outlines for teaching - Define duties for each chapter - Ask the student to attend lectures for practice solving problem 	1. Midterm's exam. 2. Writing reports on selected parts of the course 4. Discussions on how to simplify or analyze some phenomena.
2.2	Derive the physical laws and formulas related to the laws of modern physics		
2.3	Analyse the quantitative results.		
3.0	Values		
3.1	Show responsibility for self-learning to be aware of recent developments in modern physics.	<ul style="list-style-type: none"> - Enhance educational skills. - Develop their interest in modern physics. - Encourage the student to attend lectures regularly - Give students tasks of duties 	1-Evaluate the efforts of each student in preparing the report on selected parts of the course. 2-Evaluate the work in a team...
3.2	Collaborate with the others to resolve problems.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework and Participation in class	All weeks	10 %



#	Assessment task*	Week Due	Percentage of Total Assessment Score
2	Quizzes	2 th -10 th week	10 %
3	Midterm exam	5 th -6 th week	30 %
4	Final exam	End of the term	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 be supervised by academic advisers in physics department and the time table for academic advice were given to the student each semester.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Arthur Beiser, "Concepts of Modern Physics", 6 th Edition, McGraw-Hill Primals, (2003).
Essential References Materials	J. Bernstein, Paul Fishbane and Stephen Gasiorowicz, Modern Physics, (2000, Hardcover).
Electronic Materials	The website of the course
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms and library.
Technology Resources (AV, data show, Smart Board, software, etc.)	
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
1. Following up the progress of students in the course.	Instructor	Homework & quiz
2. Evaluating the progress of student	Instructor	Questionnaires.



Evaluation Areas/Issues	Evaluators	Evaluation Methods
3. Evaluating the instructor	Student	Questionnaires.
4. Revision of Exam paper	Another staff member	Standards of the exam papers

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	8/3/2022

