هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title:	Physics 1 for Engineering
Course Code:	PHYS1110
Program:	BSc in engineering
Department:	All departments in the College of Engineering
College:	Engineering
Institution:	Umm Al-Qura University
Version:	47
Last Revision Date:	12/1/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (1)					
4. Course General Description:					
The course covers some of the main principles of general physics, such as measurements, vectors, motion, Newton's laws, work and energy, thermodynamics and acoustics.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
The course is designed to provide students with some basic and essential concepts in general physics (mechanics, thermodynamics and acoustics). The main subjects that this course covers are listed below. In addition to these items, the students should gain practical skills through conducting experiments in the laboratory.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	90	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**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define the concepts of the measurements, length, time, and weight.	K1	Lectures and lab experiments	Exams, homework and quizzes
1.2	Differentiate between the vectors and the scalars	K1		
1.3	Describe the behavior of sound waves	K2		
2.0	**Skills**			
2.1	Apply Newton's laws of motion to calculate the position, velocity and acceleration in one and multiple dimensions.	S1	Lectures and lab experiments	Exams, homework and quizzes
2.2	Relate force to potential and kinetic energies	S2		
2.3	Explain the properties of heat.	S2		
2.4	Conduct experiments and analyze data	S3		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively responsibly in teamwork	V1	Lectures and lab experiments	Exams, homework and quizzes
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Measurement** • Measuring Things • The International System of Units • Changing Units • Time • Mass	3
2.	**Motion Along a one, two and three dimensions** • Position and Displacement (in one, two and three dimensions) • Average Velocity and Average Speed(in one, two and three dimensions) • Instantaneous Velocity and Speed (in one, two and three dimensions) • Acceleration (in one, two and three dimensions) • Constant Acceleration • Free-Fall Acceleration • Projectile Motion	7
3.	**Vectors** • Vectors and Scalars • Adding Vectors Geometrically • Components of Vectors • Unit Vectors • Adding Vectors by Components	3

	• Multiplying Vectors	
4.	**Force and Motion** • Newton's First Law • Force • Mass • Newton's Second Law • Newton's Third Law • Applying Newton's Laws • Friction (static and dynamic coefficients)	6
5.	**Energy and Work** • Kinetic, potential and mechanical energy • Work • Work and Kinetic Energy • Power • Conservation of Energy	4
6.	**Center of Mass and Linear Momentum** • The Center of Mass • Linear Momentum • Conservation of Linear Momentum • Inelastic and Inelastic Collisions in One Dimension	4
7.	**Rotational motion** • Rotational Variables • Rotation with Constant Angular Acceleration • Relating the Linear and Angular Variables • Kinetic Energy of Rotation Torque • Work and Rotational Kinetic Energy • The Kinetic Energy of Rolling • Angular Momentum • Conservation of Angular Momentum	7
8.	**Equilibrium and Elasticity** • Equilibrium	3

	• The Requirements of Equilibrium • Some Examples of Static Equilibrium • Elasticity • Indeterminate Structures • Elasticity	
9.	**Waves and Acoustics** • Variables of a wave: frequency, wavelength and period • Speed of Sound • Interference • Sound Sanding Waves in Pipes • The Doppler Effect	4
10.	**Heat and Thermodynamics** • Temperature • The Zeroth Law of Thermodynamics • The Celsius and Fahrenheit Scales • Thermal Expansion • Temperature and Heat • The Absorption of Heat • Heat and Work	4
11.	**Practical Part:** • Students will conduct various experiments in the practical part of the course. Each student will perform the experiment, collect data, extract result, and prepare a written report every week.	45
Total		**90**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and homework	All weeks	10%
2.	Midterm exam	9th week	20%
3.	Lab report	Every week	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Lab final practical exam	17th week	10%
5.	Final exam	End of term	50%

*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	Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classrooms and labs
Technology equipment (projector, smart board, software)	• Blackboard • Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Questionnaire (indirect)
Effectiveness of Students assessment	Instructors of the course	Peer review of exam marking (direct)
Quality of learning resources	Instructor	Course report (indirect)
The extent to which CLOs have been achieved	Instructor	Course report (indirect)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Specification
(Bachelor)

Course Title:	Physics 2 for Engineering
Course Code:	PHYS1111
Program:	BSc in engineering
Department:	All departments in the College of Engineering
College:	Engineering
Institution:	Umm Al-Qura University
Version:	47
Last Revision Date:	12/1/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
2. Course type					
A.	☐ University	☒ College	☐ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (1)					
4. Course General Description:					
After completing the first general physics course (prior to this course), students will study in this course some basic concepts of electricity and magnetism besides basic principles of optics as well. This includes Coulomb's law, electric potential, Gauss's law, electric and magnetic fields, and electric current and circuits, induction and Faraday's law, and geometrical optics.					
5. Pre-requirements for this course (if any)**:**					
Physics 1 for Engineering PHYS1110					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
The course is designed to provide students with some basic and essential concepts in general physics (E & M, and optics). The main subjects that this course covers are listed below. In addition to these items, the students should gain practical skills through conducting experiments in the laboratory.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	90	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**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define electricity concepts such as electric change, potential, current and field	K1	Lectures and lab experiments	Exams, homework and quizzes
1.2	Explain phenomena related to magnetic and electric fields	K2		
1.3	Explain the interaction of light with materials	K3		
2.0	**Skills**			
2.1	Calculate force due to magnetic and electric fields	S1	Lectures and lab experiments	Exams, homework and quizzes
2.2	Relate electric field to magnetic field (and their applications)	S2		
2.3	Analyze electric circuits	S3		
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively responsibly in teamwork	V1	Lectures and lab experiments	Exams, homework and quizzes

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Electric charge** • Electric Charge • Conductors and Insulators • Coulomb' Law • Charge is Quantized	4
2.	**Electric fields** • The electric field • The electric field due to a point charge • A point charge in an electric field	2
3.	**Gauss' law** • Flux of an Electric Field • Gauss' Law • Applying Gauss's Law : Planar Symmetry	5
4.	**Electric potential** • Electric potential energy • Electric potential • Calculating the potential from the field • Potential due to a point charge and due to a group of point charges • Calculating the field from the potential • Electric potential energy of a system of point charges	5
5.	**Capacitance** • Capacitance • Calculating the Capacitance of a Parallel-Plate Capacitor (only) • Capacitor in Parallel and in Series • Energy Stored in an Electric Field	4

	• Capacitor with a Dielectric	
6.	**Current and resistance** • Electric current • Current density • Resistance and resistivity • Ohm's law • Power in electric circuits	4
7.	**Circuits** • Work, Energy and Emf • Calculating the Current in a Single- Loop Circuit • Other single-Loop Circuits • Multiloop Circuits • RC Circuits	6
8.	**Magnetic fields** • The definition of b • A circulating charged particle • Magnetic force on a current-carrying wire	2
9.	**Magnetic fields due to currents** • calculating the magnetic field due to a current • Ampere's law • Solenoids and toroids	4
10.	**Induction and Inductance** • Faraday's Law of Induction • Induced Electric Fields • Inductors and Inductance • Self-Induction • Energy Stored in a Magnetic Field • Mutual Induction	4
11.	**Optics** • Reflection and Refraction (Snell's Law) • Total Internal Reflection	5

	• Images: Plane Mirrors, Spherical Mirrors and Thin Lenses	
12.	**Practical part:** • Students will conduct various experiments in the practical part of the course. Each student will perform the experiment, collect data, extract result, and prepare a written report every week.	45
Total		**90**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and homework	All weeks	10%
2.	Midterm exam	9th week	20%
3.	Lab report	Every week	10%
4.	Lab final practical exam	17th week	10%
5.	Final exam	End of term	50%

*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	Halliday & Resnick, Jearl Walker, “Fundamentals of Physics” 10th Edition (2018)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classrooms • Labs
Technology equipment (projector, smart board, software)	• Blackboard • Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Questionnaire (indirect)
Effectiveness of Students assessment	Instructors of the course	Peer review of exam marking (direct)
Quality of learning resources	Instructor	Course report (indirect)
The extent to which CLOs have been achieved	Instructor	Course report (indirect)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Specification
(Bachelor)

Course Title:	Medical Physics
Course Code:	PHYS1112
Program:	Bachelor's Degree in Medical Sciences
Department:	
College:	Applied Medical Science
Institution:	University Umm AlQura
Version:	47
Last Revision Date:	12/1/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2 hours)					
2. Course type					
A.	☐ University	☒ College	☐ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (Level 6/3rd Year.)					
4. Course General Description:					
This course aims to provide students in medical science with the basic theoretical and practical concepts and laws of physics applied in health science. The course covers a wide range of topics related to physics, such as the laws of motion, the study of equilibrium and stability, the calculation of forces on muscles and joints, and the mechanical advantage of levers in the human body. Also, this course covers the laws of fluid statics and dynamics and their applications to the blood circulatory system, the study of optical systems, the application of lenses in the correction of some human eye defects, the concepts of nuclear physics and radioactive decay and the interaction of radiations with the living systems.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
By the end of this course, the student will be able to: **1.** Realize the connection between physics and medicine. **2.** Recognize the role of physics in diagnosis and therapy. **3.** Understand the working mechanism of some parts of the human body. **4.** Solve physics problems related to medicine. **5.** Develop problem-solving and critical-thinking skills.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%

No	Mode of Instruction	Contact Hours	Percentage
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**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the basic physical quantities and their standard units	K1	Lectures	Exams quizzes Homeworks
1.2	Understand the main concepts and laws of medical physics	K1	Lectures	Exams quizzes Homeworks
1.3	Explain the functioning of some human body systems using physical laws	K2	Lectures	Exams quizzes Homeworks

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Apply physical approaches to some parts of the human body systems.	S1	Lectures	Exams quizzes Homeworks
2.2	Calculate quantities such as effective doses, efforts on muscules,….	S2	Lectures	Exams quizzes Homeworks
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively responsibly in teamwork	V1	Lectures	Exams quizzes Homeworks
…				

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to Medical Physics and Measurements** ● Role of physics in medicine (diagnosis-therapy-Surgery) ● Measurements and standards ● Scientific notation ● Conversion of units ● Calculation of medical doses	4
2.	**Force and motion** ● Introduction to vectors ● Forces ● Types of forces (Tension force, static friction, kinetic friction,..) ● Newton's laws of motion ● Equilibrium on an inclined surface	4
3.	**Statics** ● Torque and couple ● Equilibrium of a rigid body ● Levers in the human body	4

	• Forces on muscles and joints • The center of mass • Stability	
4	**Mechanics of non-viscous fluids** • Pressure • Pascal principle • Measurement of pressure • Blood pressure • The flow rate • The continuity equation • Bernoulli's equation	4
5	**Fluid dynamics of viscous fluids** • Viscosity • Blood viscosity • Poiseuille's law • Pressure drop in the circulatory system	2
6	**Optics and imaging systems** • Electromagnetic waves • Reflection • Refraction • Thin lenses and ray diagrams • The human eye • Correction of human eye defects	4
7	**Sound and hearing** • Sound waves in matter • Pitch and loudness of sound • Resonance of sound • Hearing and ear • Ultrasound imaging	3
8	**Nuclear Physics** • Structure and properties of the nucleus	2

	• Radioactivity • Half-life • Radiation therapy	
9	**Ionized radiation** • The interaction of radiation with matter • The radiation units • Measurement of radiation (dosimetry) • Exposer and absorbed doses	3
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and homework	All weeks	20%
2.	Midterm exam	9th week	30%
5.	Final exam	End of term	50%

*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 Biological Physics for Health and Life Sciences by Kristen Franklin, 2nd Edition (Wiley 2019) • Physics for biology and medicine, Paul Davidovits, Fourth Edition, Elsevier Academic Press.
Supportive References	• Physics for Scientists & Engineers with Modern Physics 4th Edition by Douglas Giancoli, 4th Edition (2014).
Electronic Materials	
Other Learning Materials	https://phet.colorado.edu/ https://www.myphysicslab.com/ https://onlinelabs.in/physics https://www.omnicalculator.com/physics

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom • Library
Technology equipment (projector, smart board, software)	• Blackboard • Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Department	Questionnaire
Effectiveness of Students assessment	Instructors	Exams
Quality of learning resources	Faculty	Course report
The extent to which CLOs have been achieved	Program Leaders	Course report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physics Department Council
REFERENCE NO.	Minutes of session No. xx
DATE	x/x/2025

Course Specification
(Bachelor)

Course Title:	General physics
Course Code:	PHYS1113
Program:	BSc
Department:	All departments in the College of Computing
College:	College of Computing
Institution:	Umm Al-Qura University
Version:	47
Last Revision Date:	12/1/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☒ College	☐ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (1)					
4. Course General Description:					
The course covers some of the main principles of mechanics in general physics, such as measurements, vectors, motion in one dimension, Newton's laws, work and energy.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
The course is designed to provide students with some basic and essential concepts in general physics. The main subjects that this course covers are listed below. In addition to these items, the students should gain practical skills through conducting experiments in the laboratory.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	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**	30
2.	**Laboratory/Studio**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the concepts of the measurements, length, time, and weight.	K1	Lectures and lab experiments	Exams, homework and quizzes
1.2	Differentiate between the vectors and the scalars	K2		
…				
2.0	**Skills**			
2.1	Apply Newton's laws of motion to calculate the position, velocity and acceleration.	S1	Lectures and lab experiments	Exams, homework and quizzes
2.2	Explain the motion in one and two dimensions.	S2		
2.3	Relate force to potential and kinetic energies	S2		
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively responsibly in teamwork	V1	Lectures and lab experiments	Exams, homework and quizzes

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Measurement** ● Measuring Things ● The International System of Units ● Changing Units ● Time ● Mass	3
2.	**Motion Along a Straight Line** ● Motion ● Position and Displacement ● Average Velocity and Average Speed ● Instantaneous Velocity and Speed ● Acceleration ● Constant Acceleration ● Free-Fall Acceleration	4
3.	**Vectors** ● Vectors and Scalars ● Adding Vectors Geometrically ● Components of Vectors ● Unit Vectors ● Adding Vectors by Components ● Multiplying Vectors	4
4.	**Motion in Two and Three Dimensions** ● Position and Displacement ● Average Velocity and Instantaneous Velocity ● Average Acceleration and Instantaneous Acceleration ● Projectile Motion	5

	• Uniform Circular Motion	
5.	**Force and Motion** • Newton's First Law • Force • Mass • Newton's Second Law • Newton's Third Law • Applying Newton's Laws • Friction (static and dynamic coefficients)	**6**
6.	**Kinetic Energy and Work** • Kinetic Energy • Work • Work and Kinetic Energy • Power	**4**
7.	**Potential Energy and Conservation of Energy** • Potential Energy • Determining Potential Energy Values • Conservation of Mechanical Energy • Work Done on a System by an External Force • Conservation of Energy	**4**
8.	**Practical Part:** • Students will conduct various experiments in the practical part of the course. Each student will perform the experiment, collect data, extract result, and prepare a written report every week.	**45**
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and homework	All weeks	10%
2.	Midterm exam	9th week	20%
3.	Lab report	Every week	10%
4.	Lab final practical exam	17th week	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	Final exam	End of term	50%

*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	• Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classrooms and labs
Technology equipment (projector, smart board, software)	• Blackboard • Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Questionnaire (indirect)
Effectiveness of Students assessment	Instructors of the course	Peer review of exam marking (direct)
Quality of learning resources	Instructor	Course report (indirect)
The extent to which CLOs have been achieved	Instructor	Course report (indirect)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Specification
(Bachelor)

Course Title:	Physics for Engineering
Course Code:	PHYS1114
Program:	BSc
Department:	All departments in the College of Computing
College:	College of Computing
Institution:	Umm Al-Qura University
Version:	47
Last Revision Date:	12/1/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (1)					
4. Course General Description:					
After completing the first general physics course (prior to this course), students will study some basic concepts of electricity and magnetism in this course. This includes: Coulomb's law, electric potential, Gauss's law, electric and magnetic fields, and electric current and circuits, induction and Faraday's law.					
5. Pre-requirements for this course (if any)**:**					
General Physics PHYS1113					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
The course is designed to provide students with some basic and essential concepts in general physics (E & M). The main subjects that this course covers are listed below. In addition to these items, the students should gain practical skills through conducting experiments in the laboratory.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	90	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**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the interaction of electric field with matter	K1	Lectures and lab experiments	Exams, homework and quizzes
1.2	Explain magnetic field formation	K2		
...				
2.0	Skills			
2.1	Apply Coulomb's law, electric field of static charge	S1	Lectures and lab experiments	Exams, homework and quizzes
2.2	Relate electric field to magnetic field	S2		
2.3	Analyze electric circuits	S3		
3.0	Values, autonomy, and responsibility			
3.1	Work effectively responsibly in teamwork	V1	Lectures and lab experiments	Exams, homework and quizzes

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Electric charge** • Electric Charge • Conductors and Insulators • Coulomb' Law • Charge is Quantized	4
2.	**Electric fields** • The Electric Field • Electric Field Lines • The Electric Field Due to a Point Charge • A Point Charge in an Electric Field	3
3.	**Gauss' law** • Flux of an Electric Field • Gauss' Law • Gauss' Law and Coulomb' Law • Applying Gauss's Law : Planar Symmetry	6
4.	**Electric potential** • Electric Potential Energy • Electric Potential • Equipotential Surfaces • Calculating the Potential from the Field • Potential Due to a Point Charge • Potential Due to a Group of Point Charges • Calculating the Field from the Potential • Electric Potential Energy of a System of Point Charges	6
5.	**Capacitance** • Capacitance	4

	• Calculating the Capacitance of a Parallel-Plate Capacitor • Capacitor in Parallel and in Series • Energy Stored in an Electric Field • Capacitor with a Dielectric	
6.	**Current and resistance** • Electric current • Current Density • Resistance and Resistivity • Ohm's Law • Power in Electric Circuits	4
7.	**Circuits** • Work, Energy and Emf • Calculating the Current in a Single- Loop Circuit • Other single-Loop Circuits • Multiloop Circuits • RC Circuits	6
8.	**Magnetic fields** • The production of a Magnetic Field The Definition of B • A Circulating Charged Particle • Magnetic Force on a Current-Carrying Wire	3
9.	**Magnetic fields due to currents** • Calculating the Magnetic Field due to a Current • Ampere's Law • Solenoids and Toroids	4
10.	**Induction and Inductance** • Faraday's Law of Induction • Lenz's Law • Induced Electric Fields • Inductors and Inductance	5

	• Self-Induction • Energy Stored in a Magnetic Field • Mutual Induction	
11.	**Practical Part:** • Students will conduct various experiments in the practical part of the course. Each student will perform the experiment, collect data, extract result, and prepare a written report every week.	45
Total		**90**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and homework	All weeks	10%
2.	Midterm exam	9th week	20%
3.	Lab report	Every week	10%
4.	Lab final practical exam	End of term	10%
5.	Final exam	End of term	50%

*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	Halliday & Resnick, Jearl Walker, “Fundamentals of Physics” 10th Edition (2018)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classrooms and labs
Technology equipment (projector, smart board, software)	• Blackboard • Projector

Items	Resources
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Questionnaire
Effectiveness of Students assessment	Instructors of the course	Peer review of exam marking
Quality of learning resources	Instructor	Course report
The extent to which CLOs have been achieved	Instructor	Course report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Specification
(Bachelor)

Course Title: Physics in health sceinces
Course Code: PHYS1115
Program: Bachelor of Environmental Health Sciences
Department: Environmental and Occupational Health
College: Faculty of Public Health and Health Informatics
Institution: Umm Al-Qura University, Makkah, Saudi Arabia
Version: V1
Last Revision Date: 31/12/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 credit hrs (2 h : Lectures + 1 h: Laboratory)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3/2)					
4. Course General Description:					
This course introduces fundamental physics principles and their applications in health sciences, particularly in the fields of medicine, nursing, physical therapy, and medical technology. Emphasis is placed on understanding the physical principles underlying the human body's functions, diagnostic techniques, and medical equipment. Topics covered include mechanics, thermodynamics, waves, sound, electricity, magnetism, radiation, and imaging techniques used in healthcare					
5. Pre-requirements for this course (if any)**:**					
-					
6. Co-requisites for this course (if any)**:**					
-					
7. Course Main Objective(s):					
Be the end of the course, students should to: 1. Provide foundational knowledge of physics principles and their application in health sciences. 2. Explain the role of physics in understanding the human body, diagnostic technologies, and therapeutic tools. 3. Develop skills in applying physical concepts to solve problems in healthcare and medical technologies.					

2. 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

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**45**
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		**75**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand fundamental principles of mechanics, thermodynamics, electricity, magnetism, and optics.	K1	Interactive Lecturing	Examinations
1.2	Explain the physics behind diagnostic tools like X-rays, MRI, and ultrasound.	K1	Interactive Lecturing	Examinations
1.3	Describe the interaction of radiation with matter and its applications in health sciences.	K2	Interactive Lecturing	Examinations
2.0	Skills			
2.1	Apply physics concepts to analyze physiological processes and medical equipment.	S4	Interactive Lecturing Independent studies classroom	Examinations
2.2	Perform experiments and data analysis related to health physics..	S4	Interactive Lecturing Independent studies classroom	Examinations
3.2	Operate basic diagnostic and therapeutic devices while ensuring safety protocols.	S4	Interactive Lecturing Independent studies classroom	Examinations

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Emphasize the importance of patient safety in the application of physics to healthcare	V1	Interactive Lecturing Independent studies classroom	Presentations
3.2	Promote teamwork and collaboration in both laboratory settings and healthcare environments	V1	Interactive Lecturing Independent studies classroom	Presentations

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Physics in Health Sciences	2
2.	Kinematics and Dynamics	2
3.	Work, Energy, and Power	2
4.	Biomechanics of the Human Body	2
5.	Fluid Mechanics and Blood Circulation	2
6.	Thermodynamics in the Human Body	2
7.	Thermodynamics in the Human Body (cont.)	2
8.	Waves and Sound in Medicine	2
9.	Electricity and Magnetism in Healthcare	2
10.	Electromagnetic Waves and Medical Imaging	2
11.	Electromagnetic Waves and Medical Imaging (cont.)	2
12.	Optics and Vision	2
13.	Radiation and Radioactivity in Medicine	2
14.	Radiation and Radioactivity in Medicine(cont.)	2
15.	Safety in Medical Physics	2
16.	Practical Part: Students will conduct various experiments in the practical part of the course. Each student will perform the experiment, collect data, extract result, and prepare a written report every week.	45
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and homework	All weeks	10%
2.	Midterm exam	9th week	20%
3.	Lab report	Every week	10%
4.	Lab final practical exam	17th week	10%
5.	Final exam	End of term	50%
6.			

*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	Physics in Biology and Medicine, Fifth Edition, Paul Davidovits Elsevier Inc. 2019
Supportive References	• Libarary and databases at Umm Al Qura University https://uqu.edu.sa/lib/917
Electronic Materials	• Khan Academy https://www.khanacademy.org
Other Learning Materials	• Coursera https://www.coursera.org/

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- Classroom with proper and comfortable seating arrangements for students
Technology equipment (projector, smart board, software)	- Projector and teaching board - Internet access during the working day
Other equipment (depending on the nature of the specialty)	No other resources are required

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students and Faculty	Direct: Student feedback surveys, Committee meeting (Review of course materials and resources)
Effectiveness of students' assessment	Faculty and Program Leaders	Evaluation of assessment results and trends.
Quality of learning resources	Students, Faculty and Program Leaders	Direct: Student feedback surveys, Committee meeting (Review of course materials and resources)
The extent to which CLOs have been achieved	Faculty and Program Leaders	Direct: Analysis of learning outcomes data.
Other		-

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Specification

(Bachelor)

Course Title:	Physics for Pharmacy
Course Code:	PHD 3102
Program:	Doctor of Pharmacy
Department:	Pharmaceutical Sciences
College:	Pharmacy
Institution:	Umm Al-Qura University
Version:	1
Last Revision Date:	January, 2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (First semester/ First year)					
4. Course General Description:					
This course introduces pharmacy students to the fundamental principles of physics and their applications in pharmaceutical sciences. It covers states and properties of matter, mechanics (motion, forces, Newton's laws, energy, and friction), fluid mechanics (statics, dynamics, and viscosity), and thermodynamics (heat, energy, and phase changes). Additional topics include ionic equilibria, solubility, and diffusion, essential for drug formulation and delivery. Case studies and problem-solving exercises reinforce concepts, enabling students to apply physics principles to optimize pharmaceutical processes in professional practice.					
5. Pre-requirements for this course (if any)**:**					
N/A					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
To equip pharmacy students with a foundational understanding of physics principles and their applications in pharmaceutical sciences, enabling them to analyze, optimize, and apply these concepts in drug formulation, delivery systems, and other pharmaceutical processes.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	26
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	4
5.	**Others (specify)**	
Total		**30**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Classify the states of matter, their properties, and their relevance to pharmaceutical sciences.	**K1**	**Lectures**	• **Written exams** • **Problem and exercises**
1.2	Explain the principles of motion, forces, energy, and their applications in drug manufacturing and equipment.	**K1**		
1.3	Describe the behavior of fluids, thermodynamic processes, and ionic equilibria in pharmaceutical systems.	**K2**		
2.0	**Skills**			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.1	Apply physics principles to solve problems related to fluid dynamics, thermodynamics, and mechanics in pharmaceutical contexts.	**S1**	**Lectures**	• **Problem and exercises** • **Case-studies discussion**
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate teamwork skills by actively collaborating with peers to solve problems related to physics applications in pharmaceutical sciences.	**V3**	**Tutorials**	• **Problem and exercises** • **Case-studies discussion**

C. Course Content

No	List of Topics	Contact Hours
1.	State of Matters and properties of matters I	2
2.	Properties of matters II	2
3.	Determination of the physical properties of drug molecules	2
4.	Montion in one dimension and its effect on molecules sedimentation in case of different liquid dosage forms	2
5.	PH calculation and buffer systems for different dosage forms	2
6.	Work and energy (work, energy, and law of conservation of energy) and their effect on the stability of different pharmaceutical preparations	2
7.	Fluid Statics (fluids, Archimedes' principle, and Pascal's principle)	2
8.	Fluid dynamics I (Flow) and the evaluation of solution dosage form flowability	2
9.	Fluid dynamics II and evaluation of the viscosity of different pharmaceutical preparations	2
10.	Case studies and problems I	2
11.	Thermodynamics I (temperature, heat, kinetic theory, and phase change) and arrhenius equation for estimating the shelf life of different pharmaceutical preparations	2
12.	Temperature and accelerated stability testing of different pharmaceutical preparations	2
13.	Ionic equilibria and Solubility I	2

14.	Methods applied to improve the solubility of different drugs	2
15.	Case studies and problems II	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Exit card (in-class assessment)	4	5%
2.	Midterm exam	7	30%
3.	Cases-studies and tutorials	7 and 15	5%
4.	Exercise assignment	10	10%
5.	Final written exam	17-18	50%

*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	Sinko, P.J. (2024) *Martin's Physical Pharmaceutical Sciences: Physical Chemical and Biopharmaceutical Principles in Pharmaceutical Sciences*. Philadelphia, PA: Wolters Kluwer.
Supportive References	-
Electronic Materials	https://openstax.org/details/books/college-physics-2e
Other Learning Materials	Videos and handouts

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom:** Equipped with comfortable seating, adequate lighting, and acoustics for interactive learning. In addition to space for group activities and discussions.
Technology equipment (projector, smart board, software)	**Projectors and screens:** For display presentations, animations, and visual aids during lectures. **Smart boards:** Interactive tools for illustrating concepts and solving problems
Other equipment (depending on the nature of the specialty)	**Learning Management System (LMS):** Platforms such as Blackboard for sharing resources, assessments, and collaborative activities.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of Students' assessment	Students	Direct
Quality of learning resources	Teaching staff and students	Direct
The extent to which CLOs have been achieved	Teaching staff/ program leaders	Direct
Other	Peer reviewer	Direct

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title:	Electricity and magnetism for chemists
Course Code:	PHYS3304
Program:	Chemistry
Department:	Chemistry
College:	Science
Institution:	Umm Al-Qura University
Version:	47
Last Revision Date:	12/1/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 1)					
4. Course General Description:					
This course will provide a conceptual background in physics of electricy and magnetism. It covers the following: Electric charge, electric fields, superposition, Gauss' Law, surface integrals, electric flux, the electric potential, simple circuits, Ohm's Law, and capacitors, Magnetic Fields, Magnetic Fields due to Currents, Maxwell's equation.					
5. Pre-requirements for this course (if any)**:**					
General Physics PHYS1101					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
After completing this course students should be able to deal with the following concepts: 1. properties of the electric charge 2. Electric field 3. Electric potential 4. Electric flux through a surface. 5. Electric current, resistors, batteries, and capacitors, Ohm's Law, Kirchhoff's laws, and RC charging and decay circuits. 6. Magnetic field 7. In addition to these items, the students should gain practical skills through performing some experiments.In addition to these items, the students should gain practical skills through performing some experiments.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%

No	Mode of Instruction	Contact Hours	Percentage
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**	30
2.	**Laboratory/Studio**	45
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the concepts of electricity such as electric charge, Coulomb law, Electric field, Electric potential, Electric flux through a surface..	K1	Lectures and lab experiments	Exams, Homework and Quizzes
1.2	Explain the phenomenon of electromagnetic induction.	K2		
...				

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Relate DC current variables to AC current variables	S1	Lectures and lab experiments	Exams, Homework and Quizzes
2.2	Calculate the magnetic field.	S2		
2.3	Analyze electric circuit theoretically and experimentally	S3		
...				
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively individually or within a team	V1	• Lectures and lab experiments	Exams, Homework and • Quizzes
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Coulomb's Law • Electric Charge, Coulomb's Law.	2
2.	Electric Fields • The Electric Field, Electric field lines, Electric Field Due to a Charged particle, Electric Dipole, The Electric Field Due to an Electric Dipole.	4
3.	Gauss' Law • Flux of an Electric Field, Gauss' Law, Applying Gauss' Law	2
4.	Electric Potential • Electric Potential, Electric Potential Energy, Equipotential surfaces, Calculating the potential from the field, Potential Due to a Point Charge, Potential Due to a Continuous Charge Distribution.	4
5.	Capacitance • Capacitors, Capacitance, Calculating the Capacitance, Capacitors in Parallel and in Series, Energy Stored in an Electric Field.	3
6.	Current and Resistance • Electric Currents, Current density, Resistance and Resistivity, Ohm's Law, Power in Electric Circuits.	3
7.	Circuits	2

	• Single-Loop circuits, Multiloop Circuits (resistors in parallel and in series), Charging and Discharging a Capacitor. Sample problems.	
8.	Magnetic Fields • The source of a Magnetic Field The Definition of the Magnetic Field, A Circulating Charged Particle, Cyclotrons and Synchrotrons, Magnetic Force on a Current-Carrying Wire, Torque on a Current Loop, The Magnetic Dipole Moment.	2
9.	Magnetic Fields Due to Currents • Calculating the Magnetic Field Due to a Current, Force Between Two Parallel Currents, Ampere's Law, Solenoids and Toroids.	2
10.	Induction and Inductance • Faraday's Law of Induction, Inductors and Inductance, Self-Induction.	2
11.	Maxwell's Equations; Magnetism of Matter • Gauss' Law for Magnetic Fields, Induced Magnetic Fields, Displacement Current, Maxwell's Equations, Magnets, Magnetism and Electrons, Magnetic Materials, Diamagnetism, Paramagnetism, Ferromagnetism	4
12.	Practical Part: • Students will conduct various experiments in the practical part of the course. Each student will perform the experiment, collect data, extract result, and prepare a written report every week.	45

Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	8th week	20%
2.	HomeWorks & Quizzes	All weeks	10%
3.	Lab. Reports	All weeks	10%
4.	Lab. Exam	End of term	10%
5.	Final Exam	End of term	50%
...	Total		100%

*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	• Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018)
Supportive References	• Physics for Scientists & Engineers with Modern Physics 4th Edition by Douglas Giancoli, 4th Edition (2014).
Electronic Materials	Physics is Beautiful | Free, interactive physics lessons Khan Academy Physics | Physics videos The Feynman Lectures on Physics PhET Simulations | Online physics simulations
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom • Laboratory
Technology equipment (projector, smart board, software)	• Blackboard • Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Questionnaire
Effectiveness of Students assessment	Instructor	Exams
Quality of learning resources	Instructor	Course report
The extent to which CLOs have been achieved	Instructor	Course report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physics Department Council
REFERENCE NO.	Minutes of session No. xx
DATE	x/x/2025

Course Specification
(Bachelor)

Course Title:	Quantum Physics for Chemists
Course Code:	PHYS4506
Program:	Chemistry
Department:	Chemistry
College:	Science
Institution :	Umm Al-Qura University
Version:	47
Last Revision Date:	12/1/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (Level 5)					
4. Course General Description:					
This course covers some of the main principles in classical and modern physics such as: energy and work, rotation and rolling, equilibrium and elasticity, oscillations, waves, geometrical optics, interference and diffraction, photons and matter waves, the Bohr atom, uncertainty principle, and wave mechanics. A calculus-based course for chemistry major.					
5. Pre-requirements for this course (if any):					
Electricity and Magnetism for Chemists PHYS3304					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					
The course is designed to provide chemistry students with some basic and essential concepts in classical and modern physics. The main subjects that this course covers are listed below.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%

No	Mode of Instruction	Contact Hours	Percentage
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**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Differentiate between kinetic energy, potential energy, and Work	**K2**	**Lectures**	**Exams, homework and quizzes**
1.2	Describe the Rotation and Rolling motion	**K2**		
1.3	Define the physical properties of vibration and waves	**K2**		
1.4	Demonstrate the principles of quantum physics	**K2**		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Apply physics laws to Equilibrium and Elasticity problems	**S2**	**Lectures**	**Exams, homework and quizzes**
2.2	Analyze interference, diffraction, polarization of light	**S2**		
2.3	Explain the forming of optical images	**S2**		
3.0	**Values**			
3.1				

C. Course Content

No	List of Topics	Contact Hours
1.	**Energy and Work** ● Kinetic Energy ● Work ● Work and Kinetic Energy ● Potential Energy ● Conservation of Mechanical Energy ● Conservation of Energy ● The Center of Mass ● Linear Momentum ● The Linear Momentum of a System of Particles	2
2.	**Rotation** ● Rotational Variables ● Rotation with Constant Angular Acceleration ● Kinetic Energy of Rotation	4

	● Torque ● Angular Momentum	
3.	**Equilibrium and Elasticity** ● Equilibrium ● The Requirements of Equilibrium ● Example of Static Equilibrium ● Elasticity	2
4.	**Oscillations** ● Simple Harmonic Motion ● The Force Law for Simple Harmonic Motion ● Energy in Simple Harmonic Motion ● Pendulums ● Simple Harmonic Motion and Uniform Circular Motion	4
5.	**Waves** ● Types of Waves ● Transverse and Longitudinal Waves ● Wavelength and Frequency ● The Speed of a Traveling Wave ● Wave Speed on a Stretched String ● Energy and Power of a Wave Traveling Along a String ● The Wave Equation ● The Principle of Superposition for Waves ● Interference of Waves ● Standing Waves ● **Polarization** ● Reflection and Refraction	4

	● Total Internal Reflection	
6.	**Geometrical optics** ● Two Types of Images ● Plane Mirrors ● Images from Spherical Mirrors ● Thin Lenses	4
7.	**Interference** ● Light as a Wave ● Diffraction ● Young's Interference Experiment ● **Diffraction** ● Diffraction and the Wave Theory of Light ● Diffraction by a Single Slit: Locating the Minima ● Diffraction by a Double Slit ● Diffraction Gratings ● X-Ray Diffraction	4
8.	**Photons and Matter Waves** ● The Photon, the Quantum of Light ● Photons Have Momentum ● Electrons and Matter Waves ● Schrödinger's Equation ● Heisenberg's Uncertainty Principle ● Wave Functions of a Trapped Electron ● An Electron in a Finite Well ● The Bohr Model of Hydrogen	6
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework and Quizzes	During the semester	20%
2.	Midterm Exams	5th - 10th week	30%
3.	Final Exam	End of the semester	50%

*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	Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018)
Supportive References	Douglas Giancoli, Physics for Scientists & Engineers with Modern Physics, Pearson; 4th edition (August 25, 2008). ISBN-13 : 978-0131495081
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	● Classrooms
Technology equipment (projector, smart board, software)	● Blackboard ● Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct /Questionnaire
Effectiveness of Students assessment	Instructor	Direct /Exams
Quality of learning resources	Instructor	indirect /Course report
The extent to which CLOs have been achieved	Instructor	indirect /Course report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physics Department Council
REFERENCE NO.	Minutes of session No. xx
DATE	x/x/2025