هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

# Course Specifications

| | |
|---|---|
| **Course Title:** | **General Physics 3** |
| **Course Code:** | **PHY1103** |
| **Program:** | **Physics** |
| **Department:** | **Physics** |
| **College:** | **Applied Sciences** |
| **Institution:** | **Umm Al-Qura University** |

## Table of Contents

## A. Course Identification

| |
|---|
| **1. Credit hours: 4 (3+1)** |
| **2. Course type**<br>**a.** University ☐ College ☐ Department ☑ Others ☐<br>**b.** Required ☑ Elective ☐ |
| **3. Level/year at which this course is offered: Level 3rd / 1st year** |
| **4. Pre-requisites for this course** (if any): **General Physics 2** |
| **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 | 60 | 100% |
| 2 | Blended | | |
| 3 | E-learning | | |
| 4 | Distance learning | | |
| 5 | Other | | |

7. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | Lecture | 30 |
| 2 | Laboratory/Studio | 30 |
| 3 | Tutorial | |
| 4 | Others | |
| | Total | 60 |

## B. Course Objectives and Learning Outcomes

### 1. Course Description

The course will cover the principle of general physics, such as, oscillations, wave mechanics, temperature, and heat and first law of thermodynamics, kinetic theory of gas, and image.

### 2. Course Main Objective

**After completing this course student should be able to:**

1. Describe the oscillation and wave motion.
2. Define the concepts of oscillations
3. Differentiate between the motion in one dimension and circular motion and vibration.
4. Define the concepts of the wave motions.

5. Define the concepts the temperature, Heat, and first law of thermodynamics, kinetic theory of gas.
6. Define the concepts of image.

### 3. Course Learning Outcomes

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | Define the physical quantities related to the course. | K1 |
| 1.2 | Describe the concepts and physical laws related to the course using the mathematical formula. | K2 |
| 1.3 | | |
| **2** | **Skills:** | |
| 2.1 | Apply physics laws to calculate physical quantities related to the course. | S1 |
| 2.2 | Explain the procedures for scientific theoretical treatments as well as empirical observations. | S2 |
| 2.3 | | |
| **3** | **Values:** | |
| 3.1 | Work effectively responsibly in teamwork | V2 |
| 3.2 | | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | **Oscillations**<br>• Simple Harmonic Motion<br>• The Force Law for Simple Harmonic Motion<br>• Energy in Simple Harmonic Motion<br>• An Angular Simple Harmonic Oscillator<br>• Pendulums<br>• Simple Harmonic Motion and Uniform Circular Motion<br>• Damped Simple Harmonic Motion<br>• Forced Oscillations and Resonance | 5 |
| 2 | **Waves-I**<br>• Types of Waves<br>• Transverse and Longitudinal Waves<br>• Wavelength and Frequency<br>• The Speed of a Traveling Wave<br>• Wave Speed on a Stretched String<br>• Energy and Power of a Wave Traveling Along a String<br>• The Wave Equation<br>• The Principle of Superposition for Waves<br>• Interference of Waves<br>• Phasors<br>• Standing Waves<br>• Standing Waves and Resonance | 5 |
| 3 | **Waves-II**<br>• Sound Waves<br>• The Speed of Sound<br>• Traveling Sound Waves<br>• Interference | 5 |

| | | |
|---|---|---|
| | • Intensity and Sound Level<br>• Sources of Musical Sound<br>• Beats<br>• The Doppler Effect<br>Supersonic Speeds, Shock Waves | |
| 4 | **Temperature, Heat, and First Law of Thermodynamics**<br>• Temperature<br>• The Zeroth Law of Thermodynamics<br>• Measuring Temperature<br>• The Celsius and Fahrenheit Scales<br>• Thermal Expansion<br>• Temperature and Heat<br>• The Absorption of Heat by Solids and Liquids<br>• A Closer Look at Heat and Work<br>• The First Law of Thermodynamics<br>• Some Special Cases of First Law of Thermodynamics<br>• Heat Transfer Mechanisms<br>• Systems with Varying Mass: a Rocket | **5** |
| 5 | **The Kinetic Theory of Gases**<br>• Avogadro's Number<br>• Ideal Gases<br>• Pressure, Temperature, and *rms* Speed<br>• Translational Kinetic Energy<br>• Mean Free Path<br>• The Distribution of Molecular Speeds<br>• The Molar Specific Heats of an Ideal Gas<br>• Degrees of Freedom and Molar Specific Heats<br>• The Adiabatic Expansion of an Ideal Gas | **5** |
| 6 | **Images**<br>• Two Types of Image<br>• Plane Mirrors<br>• Spherical Mirrors<br>• Images from Spherical Mirrors<br>• Spherical Refracting Surfaces<br>• Thin Lenses<br>• Optical Instruments | **5** |
| | **Practical Part:**<br>• 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. | **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 physical quantities related to the course. | | 1. Solve some examples during the lecture. |

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| 1.2 | Describe the concepts and physical laws related to the course using the mathematical formula. | 1. Demonstrating the basic principles through lectures.<br>2. Discussing phenomena with illustrating pictures and diagrams.<br>3. Lecturing method:<br>• Board, Power point.<br>• Discussions<br>• Brain storming<br>• Start each chapter by general idea and the benefit of it. | 2. Discussions during the lectures<br>3. Exams:<br>a) Quizzes<br>b) Midterm exams<br>c) Final exam. |
| 1.3 | | | |
| **2.0** | **Skills** | | |
| 2.1 | Apply physics laws to calculate physical quantities related to the course. | 1. Solve some problems in physics during lectures.<br>2. Following some proofs during lectures.<br>3. Encourage students to participate in solving problems. | 1. Solve some examples during the lecture.<br>2. Discussions during the lectures<br>3. Exams:<br>a) Quizzes<br>b) Midterm exams<br>c) Final exam |
| 2.2 | Explain the procedures for scientific theoretical treatments as well as empirical observations. | | |
| 2.3 | | | |
| **3.0** | **Values** | | |
| 3.1 | Work effectively responsibly in teamwork | • Give students tasks of duties.<br>• Organize the students as a small group in the lab. | • Evaluate the scientific reports.<br>• Discussing the reports with each teamwork.<br>• Evaluate the efforts of each student in preparing the report. |
| 3.2 | | | |

## 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | Midterm Exam | 7th | 20 % |
| 2 | HomeWorks & Quizzes | All weeks | 10 % |
| 3 | Lab. Reports and Exam | End of the semester | 20 % |
| 4 | Final Exam | End of the semester | 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 adviser in Physics Department and the time table for academic advice were given to the student each semester. (4 hrs per week)

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018) |
| **Essential References Materials** | Physics for Scientists & Engineers with Modern Physics 4th Edition by Douglas Giancoli, 4th Edition (2014). |
| **Electronic Materials** | 1. Physics is Beautiful \| Free, interactive physics lessons<br>2. Khan Academy Physics \| Physics videos<br>3. The Feynman Lectures on Physics<br>4. PhET Simulations \| Online physics simulations |
| **Other Learning Materials** | |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation**<br>(Classrooms, laboratories, demonstration rooms/labs, etc.) | • Classroom<br>• Library |
| **Technology Resources**<br>(AV, data show, Smart Board, software, etc.) | • Data show<br>• Black Bord |
| **Other Resources**<br>(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 |
|---|---|---|
| Effectiveness of teaching Strategies | Students | Questionnaire |
| Effectiveness of student assessment | Instructor | Exams |
| Extent of achievement of course learning outcomes | Instructor | Course report |
| Quality of learning resources | Instructor | Course report |

**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** | |