# Course Specification

(Bachelor)

| | |
|---|---|
| Course Title: | General Physics I |
| Course Code: | PHYS 101 |
| Program: | Physics |
| Department: | Physics |
| College: | College of Science |
| Institution: | Northern Border University |
| Version: | Version 2 |
| Last Revision Date: | 07/02/2024 |

## Table of Contents

## A. General information about the course:

### 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: ( 1st Level / 1st year)** | | | | | |
| **4. Course general Description:** | | | | | |

The course is interested in study of units and dimensions, vectors and their properties, motion in different dimensions and projectile motion. Newton's laws with examples involving friction force or without friction force. The study of kinetic and potential energy conservation and the calculation of work and power. Elastic and inelastic collision and the difference between them. The study rigid body rotation. Study the Oscillatory motion and Energy of the simple harmonic motion (S H M)**.** Finally, provide a foundational understanding of temperature concepts and its measurements.

**Lab Experiments:** Simple pendulum, Verification of Newton's 2nd law, Static and kinetic friction, Projectile motion, Hook's law, Free fall, Force balance table, Rotational motion, collision.

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

Not applicable

**6. Co-requisites for this course** (if any)**:**

Not applicable

**7. Course Main Objective(s):**

Use the concept and the theories of classical physics to study the motion of the body, the work done and the energy.

Demonstrate collaborative skills by conducting experiments, collection and interpretation of data.

### 1. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 6 | 100% |
| 2 | E-learning | - | - |
| 3 | Hybrid<br>• Traditional classroom<br>• E-learning | - | - |
| 4 | Distance learning | - | - |

### 2. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | 45 |
| 2. | **Laboratory/Studio** | 30 |
| 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 program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | Recognize the fundamentals Theory in motion, work, energy, power and describe the various physical quantities and their units & dimensions and | K1 | • Class / Group discussion<br>• Interactive learning<br>• Collaborative learning<br>• Observation<br>• Self-learning | • Written exams (essay)<br>• Objective exams<br>• self-assessment<br>• Oral exams<br>• Reports<br>• Presentations |

| Code | Course Learning Outcomes | Code of PLOs aligned with program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| | Temperature and Oscillatory motion (S H M). | | | |
| 1.2 | | | | |
| ... | | | | |
| **2.0** | **Skills** | | | |
| 2.1 | Use the suitable mathematical tools in solving problems. | S1 | • Problem-based learning<br>• Reciprocal teaching<br>Self-learning | • Laboratory Exams.<br>• Discussion<br>• self-assessment<br>• Presentations<br>Report |
| 2.2 | Conduct the experiment and Interpret The experimental data and the results. | S3 | • Lab-based learning<br>• Self-learning<br>• Observation<br>• Peer learning | • Laboratory Exams.<br>• Discussion<br>• self-assessment<br>• Presentations<br>• Reports |
| ... | | | | |
| **3.0** | **Values, autonomy, and responsibility** | | | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | Units and Dimensions: System of Units, Consistency of Units, Units Conversion | 5 |
| 2. | Vectors: Vectors Properties, Adding and Subtracting Vectors Graphically, Properties of Vector Components, Addition &Subtraction of Vectors by means of Components | 5 |
| 3. | Motion in one dimension: Displacement, Average Velocity, Instantaneous Velocity, Acceleration,<br>One Dimensional Motion with Constant Acceleration, Vertically Thrown Up and Freely Falling Bodies Motion, Motion in Two Dimensions. Projectile Motion | 5 |

| | | |
|---|---|---|
| 4. | Newton’s Law of Motion, Force and Fundamental Forces of Nature. Newton's First Law, Newton's Second Law, Newton's Third Law, Frictions<br>Experimental Facts about Friction, Applications of Newton's Laws | 8 |
| 5. | Work, Energy and Power: Work, Kinetic Energy, and the Work Energy Theorem. Gravitational Potential Energy, Conservation Laws. Work, Energy and Power, Conservative and Non-Conservative Forces. | 5 |
| 6. | Momentum, Impulse and collision: Linear Momentum and Impulse, conservation of Linear Momentum for Two particle system<br>Momentum, Impulse and Collision, Head on Collisions and Glancing Collisions, Solved Examples | 5 |
| 7. | Rotation of Rigid bodies, Angular Velocity and Acceleration<br>Rotation of Rigid bodies, Relationship between Linear and Angular Quantities | 4 |
| 8. | Oscillatory motion (S H M) - Energy of the (S H M) - Mass attached to spring | 4 |
| 9. | Temperature and Temperature Scales and Units of Temperature. | 4 |
| **Total** | | **45** |

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Graphing | 4 |
| 2 | Free falling | 4 |
| 3 | Hook's Law | 4 |
| 4 | Projectile motion | 4 |
| 5 | Newton's second law | 4 |
| 6 | Simple Pendulum | 4 |
| 7 | Collision | 4 |
| 8 | Final exam | 2 |
| Total | | 30 |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | Homework 1 | 6 | 5 |
| 2. | Quiz 1 (written test) | 7 | 5 |

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 3. | Mid-Term Exam (written test) | 9 | 20 |
| 4. | Mid-Term Practical Exam | 10 | 10 |
| 5. | Homework 2 | 11 | 5 |
| 6. | Quiz 2 (written test) | 12 | 5 |
| 7. | Report | 15 | 5 |
| 8. | Presentation | 15 | 5 |
| 9. | Final Practical Exam | 18 | 10 |
| 10. | Final Exam (written test) | 19 | 30 |
| 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 | 1) Heyde, K., (2018), Basic Ideas and Concepts in Nuclear Physics: An Introductory Approach, 3rd Ed (Series in Fundamental and Applied Nuclear Physics), CRC Press.<br>2) David Morin (2013), Introduction to Classical Mechanics: With Problems and Solutions |
| Supportive References | 1) Fundamentals of Physics Extended by David Halliday, Robert Resnick and Jearl Walker (Aug 5, 2013)<br><br>2) Student Solutions Manual for Fundamentals of Physics, 10th Ed. by David Halliday, Robert Resnick, Jearl Walker, 2013. |
| Electronic Materials | 1) Saudi Digital Library<br>2) Set of Lectures by Walter Lewin, on Newton's laws and motion, on https://www.youtube.com/watch?v=oduZsA0Tk58 |
| Other Learning Materials | YouTube videos for motion and Newton's laws, Power and Energy. |

### 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | -A classroom which accommodates 25 students<br>-Traditional Library<br>-Laboratory for experimental |
| **Technology equipment**<br>(projector, smart board, software) | Data show, Smart Board, Blackboard |

| Items | Resources |
|---|---|
| **Other equipment**<br>(depending on the nature of the specialty) | Internet connection Students |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | Students | Indirect (Course Evaluation Survey). |
| | Course Coordinator | Direct: (Observation of Lectures, Analysis of Assessment Data). |
| | Program Leaders | Indirect: (Observation of Lectures, Interview with Involved Programs, and students Interviews).<br>Direct: (Analysis of Assessment Data). |
| | Internal Quality Committee | Direct: Internal Quality Committee Report |
| Effectiveness of student's assessment | Course Coordinator | Direct: (Observation of Lectures, Analysis of Assessment Data). |
| | Internal Quality Committee | Direct: Internal Quality Committee Report |
| Quality of learning resources | Students | Indirect (Course Evaluation Survey). |
| The extent to which CLOs have been achieved | Course Coordinator | Direct: (Observation of Lectures, Analysis of Assessment Data). |
| | Program Leaders | Indirect: (Observation of Lectures, Interview with Involved Programs, and students Interviews).<br>Direct: (Analysis of Assessment Data). |
| | Internal Quality Committee | Direct: Internal Quality Committee Report |
| **Other** | | |

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

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|---|---|
| **COUNCIL /COMMITTEE** | **DEPARTMENT COUNCIL** |
| **REFERENCE NO.** | **MINUTES OF FOURTH SESSION (1445) OF PHYSICS DEPARTMENT** |

| DATE | 02/01/2024 |
| --- | --- |