# Course Specification

(Bachelor)

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|---|---|
| Course Title: | **General Physics** |
| Course Code: | **PHY 1101** |
| Program: | **Bachelor of Science in Physics.**<br>**Bachelor of Science in Applied Mathematics.**<br>**Bachelor of Science in Chemistry.**<br>**Bachelor of Science in Biology.** |
| Department: | **Physics** |
| College: | **Science** |
| Institution: | **Imam Mohammad Ibn Saud Islamic University** |
| Version: | 4 |
| Last Revision Date: | **16/11/2022** |

## Table of Contents

## A. General information about the course:

### 1. Course Identification

| | | | | | |
|---|---|---|---|---|---|
| **1. Credit hours: (4 )** | | | | | |
| **4 Credit hours (2 Lect, 2 tut, 2 lab)** | | | | | |
| **2. Course type** | | | | | |
| **A.** | ☐University | ☒ College | ☐Department | ☐Track | ☐Others |
| **B.** | ☐Required | | ☐Elective | | |
| **3. Level/year at which this course is offered: (Level 1/Year 1)** | | | | | |
| **4. Course general Description:** | | | | | |
| **This course covers topics like kinematics and the study of work and energy and. Students will gain with a deep understanding of these concepts and topics. A laboratory portion of this course will provide hands-on experience with these topics.** | | | | | |
| **5. Pre-requirements for this course** (if any)**:** | | | | | |
| **None** | | | | | |
| **6. Co-requisites for this course** (if any)**:** | | | | | |
| | | | | | |
| **7. Course Main Objective(s):** | | | | | |

- **Provide the basic concepts and build a strong foundation in the principles of classical mechanics.**
- **Analyze different physical situations and phenomena in terms of the fundamental laws of classical mechanics.**
- **Understand how these principles are applied in the world around us.**
- **Gain an understanding of the classical laws of physics and how they are applied to real world problems.**
- **Observe and analyze physical data relevant to some of the experiments in mechanics.**
- **Develop critical thinking and analytical problem-solving skills.**

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

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | **90** | **100%** |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom<br>• E-learning | | |
| 4 | Distance learning | | |

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

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | **30** |
| 2. | **Laboratory/Studio** | **30** |
| 3. | **Field** | - |
| 4. | **Tutorial** | **30** |
| 5. | **Others (specify)** | **0** |
| **Total** | | **90** |

## 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 | **Describe the concepts and principles in introductory dynamics in one and two dimensions.** | **K1, K2** | • Lectures.<br>• Tutorials.<br>Class discussions. | ▪ Exams.<br>▪ Participation.<br>Discussions. |
| 1.2 | **Outline physical phenomena using Newton's laws of motion.** | **K1, K2** | • Lectures.<br>• Tutorials.<br>• Class discussions. | ▪ Exams.<br>▪ Homework.<br>Quizzes. |
| 1.3 | **Describe physical phenomena using energy and work concepts.** | **K1, K2** | • Lectures.<br>• Class discussions.<br>• Tutorials. | ▪ Participation.<br>▪ Exams.<br>▪ Discussions.<br>▪ Homework. |
| **2.0** | **Skills** | | | |
| 2.1 | **Explain and summarize the basic knowledge gained from studying mechanics.** | **S1, S2** | ▪ Lectures.<br>▪ Class discussions.<br>▪ Tutorials. | ▪ Exams.<br>▪ Discussions.<br>▪ Participation. |
| 2.2 | **Develop the students ability to solve and analyze problems in physics related the topics covered by the course.** | **S2, S3** | ▪ Problem classes and group tutorial.<br>▪ Homework assignments as well as problems solutions. | ▪ Exams.<br>▪ Discussions.<br>▪ Homework. |
| 2.3 | **Explain and use information from the** | **S2, S3** | Experiments setting up, data recording and calculations | ▪ Compare with standard results. |

| Code | Course Learning Outcomes | Code of PLOs aligned with program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| | **output of experiment to draw conclusions.** | | based on lab manual and lectures (co-requisites). | ▪ Feedback and explanations. |
| 2.4 | **Summarize conclusions and write reports.** | **S3, S4** | Experiments setting up, data recording and calculations based on lab manual and lectures (co-requisites). | ▪ Compare with standard results.<br>▪ Feedback and explanations. |
| 2.5 | **Communicate in a clear and concise manner orally, and using IT for acquiring and analyzing information.** | **S4, S5** | • Lectures.<br>• Class discussions.<br>• Tutorials.<br>• Encourage students to use electronic mail and internal network for submitting homework and assignments.<br>• Use digital library. | ▪ Exams.<br>▪ Participation and activities of students in the course community and blackboard.<br>▪ Homework. |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| 3.1 | **Show the collaboration and inter-professionalism in class discussions or team works, as well as solve problems independently.** | **V1, V2, V3** | • Small team tasks<br>• Open discussion at classroom.<br>• Office hours. | ▪ Participation.<br>▪ Homework.<br>▪ Mini-project(s). |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | **Physics and Measurements:** Standards of length, mass, and time, dimensional analysis, conversion of units, estimates and order-of-magnitude calculations, significant figures. | **4** |
| 2. | **Motion in one dimension:** Displacement, velocity and acceleration, one dimensional motion with constant acceleration, freely falling objects. | **12** |
| 3. | **Vectors:** Vector and scalar quantities, some properties of vectors, components of a vector and unit vectors | **8** |
| 4. | **The laws of motion:** The concept of force, Newton's first law, Newton's second law, the force of gravity and weight, Newton's third law, some applications of Newton's laws, forces of friction. | **12** |
| 5. | **Work and kinetic energy:** The scalar product of two vectors, work done by a constant force, kinetic energy and the work-kinetic energy theorem. | **12** |
| 6. | **Potential energy and conservation of energy:** Potential energy, conservative and non conservative forces, conservative forces and potential energy, conservation of mechanical energy, work done by non-conservative forces, Power. | **12** |

| List of Topics *(Laboratory* | | |
|---|---|---|
| 1. | **Experiment 1:** Measurements and uncertainties. Virtual experience. | **2** |
| 2. | **Experiment 2:** Free fall. | **2** |
| 3. | **Experiment 3:** Forces in equilibrium. | **2** |
| 4. | **Experiment 4:** Simple pendulum. | **2** |
| 5. | **Experiment 5:** Constant Spring. | **2** |
| 6. | **Experiment 6:** Simple harmonic motion. | **2** |
| 7. | **Experiment 7:** Free fall: Conservation of mechanical energy of a uniformly accelerated mass. | **2** |
| 8. | **Experiment 8:** Describe the movement of an object moving at a constant speed and constant acceleration. | **2** |
| 9. | **Experiment 9:** Friction and Newton's second law. | **2** |
| 10. | **Experiment 10:** Ohm's Law. | **2** |
| **Total** | | **90** |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | **Class Activities (class quizzes, homework, solving problems, etc.....)** | **weekly** | **10 %** |
| 2. | **Laboratory** | **All the semester** | **30 %** |
| 3. | **Midterm Exam 1** | **6thweek** | **10 %** |
| 4. | **Midterm Exam 2** | **12thweek** | **10 %** |
| 5. | **Final Exam** | **16thweek** | **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** | Serway R.A. and Jewett J.W., ***Physics for Scientists and Engineers with Modern Physics,*** 9th Edition, Brooks/Cole, Belmont, CA, USA (2014). |
| **Supportive References** | Halliday D. and Resnick R., ***Physics***, 9thEdition, John Wiley and sons (2011). |
| **Electronic Materials** | **https://units.imamu.edu.sa/colleges/en/science/Pages/default.aspx** |

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|---|---|
| **Other Learning Materials** | - Laboratory Manual supplied by the Department of Physics. Laboratory Manual is available at the website of the Department of Physics. |

## 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities** (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | - **Classrooms.**<br>- **Labs.** |
| **Technology equipment** (projector, smart board, software) | - **Classroom equipped with a whiteboard and a 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**<br>**Second examiner** | **Indirect (The students complete the evaluation forms at the end of term. Final exam is evaluated by the second examiner)** |
| Effectiveness of Students assessment | **Instructors** | **Direct (exams, HW, project, …)** |
| Quality of learning resources | **Faculty**<br>**Students** | **indirect (surveys)** |
| The extent to which CLOs have been achieved | **Instructors**<br>**Program Leaders** | **Direct (excel sheet)** |
| Other | | |

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

Assessment Methods (Direct, Indirect)

## G. Specification Approval

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| **COUNCIL /COMMITTEE** | **Quality Unit-Physics Department** |
| **REFERENCE NO.** | **Department council No. 5** |
| **DATE** | **16/11/2022** |