هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title: :	**Classical Mechanics (1)**
Course Code:	**PHY 1105**
Program:	**Bachelor of Science in Physics.**
Department:	**Physics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	4
Last Revision Date:	***26/09/2024***

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 2/ Year 1)					
4. Course General Description:					
This course focuses on basic physics concepts and connections to everyday life. Course topics include linear momentum and collisions, Rotation of a rigid object about a fixed Axis, Angular momentum, Static equilibrium, Universal gravitation, and oscillatory motion. Connections to everyday life and society. While advanced mathematics is not required for this course, basic math with some trigonometry and simple algebra is utilized. Overall goals of this course include students' gaining an appreciation for the physical world, improved critical thinking and reasoning skills. General Physics (1), PHY 1101 and Calculus (1), MAT 1101.					
5. Pre-requirements for this course (if any):					
General Physics, PHY 1101 and Calculus (1), MAT 1101.					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					

- **Learn and understand the basic knowledge of Newton's equation of motion, dynamics of a system of particles, the motion in linear and circular motions.**
- **Describe the concept of momentum in both linear and circular motions.**
- **Understand the basic concepts of the gravitational force and associated law.**
- **Understand the nature and causes of oscillations and the dynamics of a system of particles.**
- **Demonstrate competence with a wide variety of classical mechanics laws and techniques.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	**30**
2.	**Laboratory/Studio**	**0**
3.	**Field**	-
4.	**Tutorial**	**30**
5.	**Others (specify)**	**0**
Total		60

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 behavior of systems in linear and rotational motions.**	**K1, K2**	• Lectures. • Tutorials. • Class discussions.	▪ Exams. ▪ Participation. ▪ Discussions.
1.2	**Outline the concepts of the linear, angular momentum and Kepler's laws.**	**K1, K2**	• Lectures. • Tutorials. • Class discussions.	▪ Exams. ▪ Homework. ▪ Quizzes.
1.3	**State the basic knowledge of gravitational force, potential and associated law.**	**K1, K2**	• Lectures. • Class discussions. • Tutorials.	▪ Participation. ▪ Exams. ▪ Discussions. ▪ Homework.
1.4	**Understand the nature and causes of oscillations.**	**K1, K2**	• Lectures. • Class discussions. • Tutorials.	▪ Participation. ▪ Exams. ▪ Discussions. ▪ Homework.
2.0	**Skills**			
2.1	**Explain and summarize the basic knowledge gained from studying mechanics.**	**S1, S2**	▪ Lectures. ▪ Class discussions. ▪ Tutorials.	▪ Exams. ▪ Discussions. ▪ Participation.
2.2	**Develop the students ability to solve and**	**S2, S3**	▪ Problem classes and group tutorial.	▪ Exams. ▪ Discussions.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	analyze problems in physics related the topics covered by the course.		• Homework assignments as well as problems solutions.	• Homework.
2.3	**Communicate in a clear and concise manner orally, and using IT for acquiring and analyzing information.**	**S4, S5**	• Lectures. • Class discussions. • Tutorials. • Encourage students to use electronic mail and internal network for submitting homework and assignments. • Use digital library.	▪ Exams. ▪ Participation and activities of students in the course community and blackboard. ▪ 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 • Open discussion at classroom. • Office hours.	▪ Participation. ▪ Homework. ▪ Mini-project(s).

C. Course Content

No	List of Topics	Contact Hours
1.	**Linear Momentum and Collisions:** Linear momentum and its conservation, impulse and momentum, collisions in one-dimension, two-dimensional collisions, the center of mass, motion of a system of particles.	**12**
2.	**Rotation of a Rigid Object about a Fixed Axis:** Angular position, velocity and acceleration, rotational kinematics (rotational motion with constant angular acceleration), angular and linear quantities, rotational kinetic energy, calculation of moments of inertia, torque, relationship between torque and angular acceleration, work and energy in rotational motion.	**12**
3.	**Angular Momentum:** The vector product and torque, angular momentum, angular momentum of a rotating rigid object, conservation of angular momentum.	**8**
4.	**Static Equilibrium:** The conditions of equilibrium, more on the center of gravity, examples of rigid objects in static equilibrium.	**8**
5.	**Universal Gravitation:** Newton's law of universal gravitation. Free-fall acceleration and the gravitational force, Kepler's laws and the motion of planets, gravitational potential energy, energy considerations in planetary and satellite motion.	**10**
6.	**Oscillatory Motion:** Motion of an object attached to a spring, mathematical representation of simple harmonic motion, energy of the simple harmonic motion, the pendulum, damped oscillations, forced oscillations.	**10**

Total	60

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.	Midterm Exam 1	6thweek	25 %
3.	Midterm Exam 2	12thweek	25 %
4.	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**
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)	- **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** - **Second examiner**	- **Indirect (The students complete**

Assessment Areas/Issues	Assessor	Assessment Methods
		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 - Students	- Indirect (surveys)
The extent to which CLOs have been achieved	- Instructors - Program Leaders	- Direct (excel sheet)
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Quality Unit-Physics Department
REFERENCE NO.	Department council No. 06
DATE	26/09/2024