

PHY1101: INTRODUCTORY CLASSICAL MECHANICS

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Introductory Classical Mechanics

Subject Code

PHY - Physics

Course Number

1101

Academic Unit

Physics (PHY)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

HKDSE Physics or equivalent

Equivalent Courses

Nil

Exclusive Courses

Nil

Additional Information

It is recommended that students complete MA1200 and MA1201 before taking the course.

Part II Course Details

Abstract

This course introduces classical mechanics, covering topics related to kinematics, Newton's laws of motion, gravity, momentum, angular momentum, work, energy, motion of rigid body, etc. The course will be heavily calculus based and serves as the first course for physics major. Basic calculus and vector calculus are introduced at the beginning. The goal of this course is to develop a conceptual understanding of core physics concepts, to make students familiar with the fundamental methodology of physics, and to provide a solid foundation for subsequent physics courses.

Course Intended Learning Outcomes (CILOs)

| CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|-------|---|--------|--------|--------|
| 1 | Recognize and use appropriately important technical terms and definitions | x | | |
| 2 | Use appropriate mathematical notations and apply in concise form the laws of classical mechanics to the study of physics problems | x | x | |
| 3 | Apply the laws of classical mechanics to the study of modern physics problems | x | x | x |
| 4 | Solve real and hypothetical problems in classical mechanics by identifying the underlying physics and analyzing the problem | x | x | x |

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

| LTAs | Brief Description | CILO No. | Hours/week (if applicable) | |
|------|-------------------|--|----------------------------|----------|
| 1 | Lecture | Explain key concepts and theory of topics of the course | 1, 2, 3 | 2 hrs/wk |
| 2 | Tutorial | Explain how some problems are solved and the techniques used explain some concepts | 1, 2, 3, 4 | 1 hr/wk |

Assessment Tasks / Activities (ATs)

| ATs | CILO No. | Weighting (%) | Remarks ("- for nil entry) | Allow Use of GenAI? | |
|-----|------------------------|---------------|----------------------------|---------------------|-----|
| 1 | Homework, Quizzes etc. | 1, 2, 3, 4 | 30 | - | Yes |

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained

Assessment Rubrics (AR)

Assessment Task

Assignment

Criterion

Capacity for using physics knowledge and theory to solve problems
Demonstrate correct understanding of key concepts.

Excellent (A+, A, A-)

Will exhibit a high level of competence in understanding, explaining, and integrating the knowledge in written format

Good (B+, B, B-)

Will exhibit a good level of competence in understanding, explaining, and integrating the knowledge in written format

Fair (C+, C, C-)

Will exhibit a basic level of competence in understanding, explaining, and integrating the knowledge in written format

Marginal (D)

Will exhibit some deficiencies in understanding, explaining, and integrating the knowledge in written format

Failure (F)

Will exhibit lack of competence in understanding, explaining, and integrating the knowledge in written format

Assessment Task

Examination

Criterion

Capacity for using physics knowledge and theory to solve problems
Demonstrate correct understanding of key concepts and physics theory.

Excellent (A+, A, A-)

Will exhibit a high level of competence in understanding, explaining, and integrating the knowledge in written format

Good (B+, B, B-)

Will exhibit a good level of competence in understanding, explaining, and integrating the knowledge in written format

Fair (C+, C, C-)

Will exhibit a basic level of competence in understanding, explaining, and integrating the knowledge in written format

Marginal (D)

Will exhibit some deficiencies in understanding about experimental methods and the interpretation of results

Failure (F)

Will exhibit lack of competence in understanding, explaining, and integrating the knowledge in written format

Part III Other Information

Keyword Syllabus

Introduction to calculus and multi-variable calculus, vector, vector calculus, and solving differential equations

Unit and dimensional analysis

Coordinate systems

Kinematics

Newton's laws of motion, the inertial frame of reference

Gravity

Circular motion

Oscillation

Fluid mechanics

Impulse and momentum

Work and energy

Motion of a rigid body

Torque and Angular momentum

Non-inertial frames and fictitious force

Reading List

Compulsory Readings

| Title | |
|-------|--|
| 1 | R. Douglas Gregory, Classical Mechanics an undergraduate text, Cambridge University Press, 2006. |

Additional Readings

| Title | |
|-------|--|
| 1 | Peter Dourmashkin, Classical Mechanics: MIT 8.01 Course Notes (available online at https://ocw.mit.edu/ans7870/8/8.01/f16/readings/MIT8_01F16_TableOfContents.pdf) |
| 2 | Hugh D. Young, Philip W. Adams, and Raymond J. Chastain, College Physics (10th Edition), Pearson, 2015. |
| 3 | Daniel Kleppner, Robert Kolenkow, An Introduction to Mechanics (2nd Edition), Cambridge, 2013. |
| 4 | David Morin, Introduction to Classical Mechanics: With Problems and Solutions (1st Edition), Cambridge, 2008. |
| 5 | L. Susskind and G. Hrabovsky, The Theoretical Minimum, Basic Books, 2013 |