PHY 218 Fundamentals of Mechanics

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This is a fundamental course in the study of physics that covers the principles governing the motion of objects. It introduces students to the basic concepts and laws that describe the behavior of particles and rigid bodies under the action of forces. The course will delve into particle dynamics, Newton's laws of motion, conservation of energy and momentum, rotational motion, angular momentum, kinematics in one dimension, relative motion, motion in two or more dimensions, circular motion, rotational kinematics and dynamics, and angular momentum. Students will gain an understanding of the relationship between force and motion, develop problem-solving skills, and learn how to apply these principles in various practical contexts.

Upon completion of this course, students will be able to:

1. Articulate Newton's laws of motion and apply them to solve problems involving particles and rigid bodies.
2. Demonstrate an understanding of the concepts of energy and momentum, including their conservation laws.
3. Analyze rotational motion and apply the principles of angular momentum to solve related problems.
4. Utilize the equations of motion to describe one-dimensional kinematics.
5. Discuss relative motion and the principles governing motion in two or more dimensions.
6. Explain and analyze circular motion, including uniform circular motion and centripetal force.
7. Interpret rotational kinematics and dynamics, including the moment of inertia and rotational inertia.
8. Solve problems involving angular momentum, including both spinning objects and systems of multiple objects.

PREREQUISITES

MAT 106 Introduction to Algebra, PHY 112 Introduction to Physics I, PHY 113 Introduction to Physics II.

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
2 Assignments	10 Points
2 Quizzes	20 Points
4 Labs	40 Points
Midterm Exam	10 Points
Final Exam	20 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F$.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Daniel Kleppner, Robert Kolenkow, ***An Introduction To Mechanics***, 2013, CAMBRIDGE UNIVERSITY PRESS.

Recommended (Optional) Texts or Other Materials:

College Physics: A Strategic Approach(3rd ed) by Knight, Jones and Field, published by Addison-Wesley, 2016

COURSE TOPICS

MODULE	TASKS

Module 1	**Topics:** Topic 1: Introduction to Mechanics Topic 2: Particle Kinematics Topic 3: Newton's Law of Motion Topic 4: Conservation of Energy **Assessments:** Assignment # 1 Lab # 1
Module 2	**Topics:** Topic 5: Conservation of Momentum Topic 6: Forces in One-Dimensional Motion Topic 7: Friction and Drag Topic 8: Work and Energy **Assessments:** Quiz # 1 Lab # 2
Module 3	**Topics:** Topic 9: Power Topic 10: Potential Energy and the Conservative Forces Topic 11: Impulse and Momentum Topic 12: Collisions **Assessments:** Midterm Exam Lab # 3
Module 4	**Topics:** Topic 13: Rotational Kinematics Topic 14: Torque and Moment of Inertia Topic 15: Rotational Dynamics Topic 16: Angular Momentum and Its Conservation **Assessments:** Assignment # 2 Lab # 4
Module 5	**Topics:** Topic 17: Circular Motion Topic 18: Centripetal Acceleration and Reaction Forces Topic 19: Relative Motion and Frames of Reference Topic 20: Motion in Two and Three Dimensions **Assessments:** Quiz # 2 Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.

2) Assignments submitted in the wrong format will be counted as not submitted.

3) Failure to submit or fulfill any required course component results in failure of the class.

4) Make-up for midterm and final exams only with valid excuses, as defined by the University.

5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (e.g., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.