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Nanchang University
PHYS310: Classical Mechanics
(Last Updated in Jan. 2025)

Credit: 4

Contact Hours

This course is composed of 24 lecture sessions, 3 tutorial sessions and 9 office contact hours. Each lecture session takes 2 contact hours in length; each tutorial session takes 3 contact hours in length; There will be a Q-A review session (3 contact hours) and Final Exam (3 contact hours) at the end of this term. This course has 72 contact hours in total.

Course Description

This course emphasizes fundamental principles of classical mechanics. It requires more mathematical skills and logical reasoning beyond introductory physics courses. Topics in this course will include Newtonian mechanics, conservation laws, oscillations, calculus of variation, Lagrangian and Hamiltonian mechanics and their application, central force problems, dynamics of rigid bodies, and coupled oscillations.

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

- Understand the principles and theories learned in this course.
- Demonstrate the ability to formulate complete written solutions to classical mechanics problems.
- Apply classical mechanics equations to solving practical problems.
- Research, write and present a paper on a related topic.

Note: This Syllabus is subject to change based on the needs of the class.

Required Textbook

Textbook: *Classical Dynamics of Particles and Dynamics* By Stephen T. Thornton and Jerry B. Marion. 5th edition. Cengage Learning.

Grading

• Attendance	5%
• Assignment	20%
• Research Paper	15%

- Presentation 10%
- Midterm 20%
- Final Exam 30%

A+ 96-100	A 90-95	A- 85-89
B+ 82-84	B 78-81	B- 75-77
C+ 71-74	C 66-70	C- 62-65
D 60-61	F < 60	

Course Schedule

The course has 24 class sessions in total. All sessions are 2 contact hours in length. At the end of this term, there will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours).
Note: the course outline and required readings are subject to change.

Class1:
Introduction to the Course

Class2:
Mathematical Reviews

Class3:
Newtonian Mechanics for Single Particle

Class4:
Conservation Theorem and Energy(Assignment 1)

Class5:
Harmonic Oscillations

Class6:
Damped Oscillations

Class7:
Forced Harmonic Motion

Class8:
Nonlinear Oscillations(Assignment 2)

Class9:
Chaos

Class10:

Gravitation

Class11:
Calculus of Variations

Class12:
Midterm

Class13:
Lagrangian Mechanics

Class14:
Hamiltonian Mechanics

Class15:
Application of Lagrangian & Hamiltonian Methods

Class16:
Central Force Motion(Assignment 3)

Class17:
Systems of Particles

Class18:
Elastic Collisions

Class19:
Nonintertial Reference Frame

Class20:
Dynamics of Rigid Bodies(Assignment 4)

Class21:
Coupled Oscillations

Class22:
Continuous Systems and Waves

Class23:
Research Paper Presentation

Class24:
Review for Final

Attending Policy

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.

Policy on "Late Withdrawals"

In accordance with university policy, appeals for late withdrawal will be approved ONLY in case of medical emergency and similar crises.

Academic Honesty

Nanchang University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

General Expectations:

Students are expected to:

— Attend all classes and be responsible for all materials covered in class and otherwise assigned;

— Complete the day's required reading and assignments before class;

— Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;

— Participate in class discussions and complete required written work on time;

— Refrain from texting, phoning or engaging in computer activities unrelated to class during the class period;

— While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Special Needs or Assistance

Please contact the 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. Our goal is to help you learn, not to penalize you for issues which mask your learning.