



Nanchang University
PHYS141: Waves, Optics and Modern Physics
(Last Updated in Jan. 2025)

Credit: 6

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 aims to teach the basic features of waves and key concepts of modern physics with laboratory. Topics mainly cover Oscillations, Wave Motion, Electromagnetic Waves, Reflection and Refraction, Lenses, Optical Instruments, The Wave Nature of Light, Diffraction, Polarization, Early Quantum Theory and Models of the Atoms, Quantum Mechanics, and Quantum Mechanics of Atoms. Students will obtain good skills in dealing with basic modern physical concepts and relations concerning waves and electromagnetic waves.

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

Required Textbook

Textbook: *Physics for Scientists and Engineers With Modern Physics*, Fourth Edition, by Giancoli, Douglas C., Pearson Prentice Hall.

Grading

•Attendance	10%
•Assignments	15%
•Labs	20%
•Midterm Exam	25%
•Final Exam	30%

Letter Grade	Grade Points
High Distinction	85-100



Distinction	75-84
Credit	65-74
Pass	50-64
Fail	0-49

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.

Class 1:

Oscillations of A Spring & Simple Harmonic Motion (SHM)

Class 2:

The Simple Pendulum & The Physical Pendulum

Class 3:

Damped Harmonic Motion & Forced Oscillations (Lab 1: Resonant Oscillations)

Class 4:

Wave Motion & Wave Equation & Superposition Principle

Class 5:

Refraction & Diffraction

Class 6:

Reflection, Transmission & Interference of Sound Waves (Lab 2: Beats)

Class 7:

Maxwell's Equations and Electromagnetic Waves

Class 8:

Light Reflection: Ray Model & Image Formation

Class 9:

Light Refraction: Index & Snell's Law (Lab 3: Total Internal Reflection)

Class 10:

Midterm

Class 11:



Thin Lens and Thin Lens Equation

Class 12:

Lensmaker's Equation

Class 13:

Optical Instruments

Class 14:

Huygens' Principle and the Law of Refraction

Class 15:

Young's Double Slit Experiment & Double Slit Interference Pattern

Class 16:

Diffraction by a Single Slit & Single-Slit Diffraction Pattern (Lab 4: Diffraction Gratings)

Class 17:

Polarization (Lab 5: Polarizers)

Class 18:

Special Theory of Relativity I

Class 19:

Special Theory of Relativity II

Class 20:

Early Quantum Theory

Class 21:

Models of the Atom

Class 22:

Quantum Mechanics

Class 23:

Quantum Mechanics of Atoms

Class 24:

Final Exam

Laboratory and Practical Exercises Schedule

Room: To be determined



Hour: 18:00 – 20:00

In order to do a good job in the experiments, it is essential that you come well prepared. Nanchang University Reading the experiment requirements for the first time in lab will put you and your partner at a disadvantage and make it very difficult to complete the experiment on time. If you have any technical questions on the pre-lab, data section or post-lab assignments, you are encouraged to ask the professor. Students need to wear suits when entering to the lab room.

No touch of the equipment without permission.

Lab 1: Resonant Oscillations

Lab 2: Beats

Lab 3: Total Internal Reflection

Lab 4: Diffraction Gratings

Lab 5: Polarizers

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.