

PHYS 350 MODERN PHYSICS

BASIC INFORMATION

Course prefix, catalog number, and title: PHYS 350, Modern Physics

Number of credits: 3 credit hours

Term and year: Spring 2023

Classes: Tu and Th 11:00 - 12:15 PM, South Engineering, RM 118

Instructor: Dr. Yongki Choi

Office location: South Engineering 220A

Office hours: Tu and Th 12:15 - 1:00 pm and by appointment

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Physics Teaching Assistants Office Hours: http://www.ndsu.edu/physics/current_students/ta_office_hours/

Student Success Program Tutoring Hours: http://www.ndsu.edu/studentsuccess/tutoring_schedule/

BULLETIN DESCRIPTION

Breakdown of classical physics, special relativity, Bohr model, Schrodinger mechanics of simple systems, atomic structure, selected topics from nuclear and solid state physics.

Pre-requisite: PHYS 252 and MATH 265

COURSE OBJECTIVES

The main objective of the course is to develop the concept and quantitative methods that are critical for a working knowledge of 21st modern physics. After completing this course, students will enhance their ability to think critically and solve real-world problems. Additionally, the student should be able to explain concepts in relativities, quantum mechanics, and statistical physics and demonstrate the ability to analyze and solve conceptual and practical problems.

REQUIRED STUDENT RESOURCES

Recommended textbook: *Modern Physics* by Paul Tipler and Ralph Llewellyn

Recommended textbook: *Modern Physics for scientists and Engineers* by John Morrison

SYLLABI ON WEB PAGES

Syllabus, Announcements, and Notes will be posted on our Blackboard course homepage: <https://bb.ndsu.nodak.edu>

HOMEWORK ASSIGNMENTS

Homework will be posted on our Blackboard course homepage. All homework assignments are due on the dates specified.

Late submissions will not receive credit.

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic	Reading /Assignment
1	Electric charge, field, potential, energy	Review
2	Electromagnetic Wave	Review
3	Relativity, Time Dilation, Length Contraction	Chapter 1
4	Relativistic momentum and energy	Chapter 2
5	General relativity	Chapter 2
6	Quantization of Charge, Blackbody Radiation	Chapter 3
7	Photoelectric Effect, Compton Effect	Chapter 3
7	Exam 1, Feb 21, 11-12:15 PM	Chapters 1-3
8	Atomic Spectra, Bohr model	Chapter 4
9	X-ray spectra, Franck-Hertz Experiment	Chapter 4
10	De Broglie Hypothesis, Wave Packets	Chapter 5
11	Spring break	

12	Uncertainty Principle, Wave-Particle Duality	Chapter 5
12	Exam 2, Mar. 30, 11-12:15 PM	Chapters 4-5
13	Schrodinger equation	Chapter 6
14	Harmonic Oscillator	Chapter 6
15	Hydrogen Atom Wave Functions	Chapter 7
16	Excited States	Chapter 7
17	Spectra of Atoms	Chapter 7
18	Final exam: May 9, 8-10 AM	Chapters 1-8

PHYS 350: EVALUATION PROCEDURES AND GRADING CRITERIA

Final letter grades for the course will be computed using the following weights:

- Homework Assignments 25 %
- Exam 1 25 %
- Exam 2 25 %
- Final Exam 25 %
- Total Points 100 %

NO MAKE-UP EXAMS ARE ALLOWED

Grades A: $\geq 85\%$, B: 75 to $< 85\%$, C: 65 to $< 75\%$, D: 55 to $< 65\%$, F: $< 55\%$

ATTENDANCE

According to [NDSU Policy 333 \(www.ndsu.edu/fileadmin/policy/333.pdf\)](http://www.ndsu.edu/fileadmin/policy/333.pdf), attendance in classes is expected. Veterans and student service members with special circumstances or who are activated are encouraged to notify the instructor as soon as possible and are encouraged to provide Activation Orders.

AMERICANS WITH DISABILITIES ACT FOR STUDENTS WITH SPECIAL NEEDS

Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor and contact the [Disability Services Office \(www.ndsu.edu/disabilityservices\)](http://www.ndsu.edu/disabilityservices) as soon as possible.

ACADEMIC HONESTY

The academic community is operated on the basis of honesty, integrity, and fair play. [NDSU Policy 335: Code of Academic Responsibility and Conduct](#) applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the [Office of Registration and Records](#). Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

**The instructor reserves the right to adjust or modify this syllabus if it is deemed beneficial to student learning*