

Fall 2024

## PHYS 234 - HM1: Physics III Lecture

Andres Jerez

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**Instructor:** Andres Jerez: [jerez@njit.edu](mailto:jerez@njit.edu)  
(When writing, please include course and section in the subject: Phys 234 HM1)

**Lectures:** Mondays and Wednesdays, 1:00 PM – 2:20 PM, CKB 124

**Office hours:** Mondays, 2:30 PM – 3:30 PM, Wednesdays, 11:30 AM – 12:30 PM, TIER 455, and by appointment.

**PREREQUISITE:** Math 112 or 112H

**FAILURE TO MEET EITHER CO-Requisites or PRE-Requisites will result in student being dropped from class.**

**COURSE MATERIAL:**

- **Mastering Physics Homework System (REQUIRED):** Each student must obtain access to Mastering Physics for University Physics with Modern Physics, 15th edition, Young and Freedman, Pearson (July 6th 2019) - Copyright © 2020, in order to be able to access the Homework and the Tutorial assignments.
  - Select “MyLab and Mastering” in the Course Navigation.
  - Select “Open MyLab & Mastering”. A new tab opens.
  - Link your student Canvas and Pearson account.
  - If prompted, select an access option
  - Select “go to my courses”
- The assignments should be accessed through Canvas.
- **Textbooks:** The homework and the structure of the course follows University Physics with Modern Physics, 15th edition, Young and Freedman, Pearson, which can be obtained as an ebook with the Mastering Physics registration. It is not a requirement, as opposed to MasteringPhysics. However, I strongly encourage you to have access and use to a College Physics textbook. An alternative to consider may be the Openstax textbooks, <https://openstax.org/details/books/university-physics-volume-3> (and volume 1 as well).

**HONORS REQUIREMENTS:** As part of your Honors course expectations, I would like you to do one of the following activities:

- Investigate a topic in Optics or Quantum Physics not covered in the course
- Explore connections between your major area(s) of interest and the subject on the course

We will meet individually over the semester to discuss the assignments. You can find more information about honors requirements [here](#).

**CANVAS:** The Learning Management System at NJIT is [Canvas](#) . Lecture notes, quizzes, grades, exams, and additional course material will be managed through Canvas.

**LECTURES:** It is expected that students will attend all lectures and recitations. Attendance will be taken at all classes and exams. More than 3 unexcused absences (in total) are excessive. If you have excusable absences contact the Dean of Students. If you must withdraw from the course, do it officially through the Registrar. Do not simply stop attending and taking exams: that forces the instructor to assign a course grade of "F."

**EXAMS:**

**Common Exams:** There will be three common exams during the semester. The exams will take place Mondays on campus, at locations that will be announced before each exam. The common exam schedule is:

- |                                   |                  |                |
|-----------------------------------|------------------|----------------|
| ▪ Common Exam 1: Monday, October  | 7 <sup>th</sup>  | 4:15 – 5:45 PM |
| ▪ Common Exam 2: Monday, November | 4 <sup>th</sup>  | 4:15 – 5:45 PM |
| ▪ Common Exam 3: Monday, November | 25 <sup>th</sup> | 4:15 – 5:45 PM |

The general policy is that students who miss a common exam will receive a score of zero for that Exam. That score will be included in the calculation of your final grade. Students that miss two common exams automatically fail the course. Students who anticipate an absence from a common exam should discuss their situation with their instructor **PRIOR TO** their absence. In order to be qualified to receive a "make-up" common exam score (a very rare occurrence), the student should present documentation for not being able to take the test as scheduled. As is the standard policy of NJIT, this documentation should be presented to the student's Physics 234 instructor AND to the Dean of Students [dos@njit.edu](mailto:dos@njit.edu) - (973) 596-3466, Campus Center, Room 255. BOTH the Physics 234 instructor and Dean of Students must concur in permitting a "make-up" common exam. Students who miss common exams that do not present documentation within 7 days of the common exam will receive a score of zero for the common exam.

In the event that the above qualification is met, a separate make-up test for the missed common quiz will not be offered. Instead, the portion of the final exam relevant to the contents of the missed test will be considered for giving a grade for the missed test. The instructor will evaluate the final exam questions from those chapters and normalize this portion of the student's grade for the missed common quiz.

**Final Exam:** TBD

**QUIZZES:** There will be quizzes during the lecture and other activities on the topics covered.

**HOMEWORK:** assignments will be posted online using the Mastering Physics System: [www.masteringphysics.com](http://www.masteringphysics.com) (see above).

**TUTORIALS:** assignments will be posted online using the Mastering Physics System: [www.masteringphysics.com](http://www.masteringphysics.com) (see above).

**GRADING:** Your final letter grade in Phys 234 will be based on a composite score that includes the quizzes, the common exams, the final exam, the homework, and the tutorials.

- **48%** for the three common exams (16% each)
- **24%** for the final exam
- **10%** for the quizzes
- **9%** for the total of homework work
- **9%** for the tutorials

The cutoff percentages for various letter grades will be in the range of:

85% for A  
80% for B+  
70% for B  
65% for C+  
50% for C  
40% for D  
F below 40 %

Final grades are not negotiable: A score of 84.999999% is a B+, not an A.

**LAST DAY TO WITHDRAW:** November 11<sup>th</sup>.

**HONOR CODE STATEMENT:** NJIT has a zero-tolerance policy for cheating of any kind and for student behavior that disrupts learning by others. Violations will be reported to the Dean of Students. The penalties range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable. **Students are required to agree to the NJIT Honor Code on each exam, assignment, quiz, etc. for the course.**

- Statement on Academic Integrity:

*“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found*

at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at [dos@njit.edu](mailto:dos@njit.edu)”*

- **Statement on Generative AI:**

*This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted throughout this course under any circumstance.*

**HELP:** Contact your instructor if you are having trouble with the course; do not simply hope for a miracle and fall further behind. There is online tutoring offered by the Physics Department. For information and appointments follow this link: <https://physics.njit.edu/physics-tutoring-sign-sheet>

**LEARNING OUTCOMES:**

- Recall the definitions and relationships involving oscillations and waves, such as wavelength, frequency, angular frequency, amplitude, phase, wave speed, restoring force, longitudinal and transverse waves, standing waves, damping, interference, diffraction, Doppler shift, and other wave phenomena.
- Comprehend the meaning of the equations governing oscillations and waves, and be able to manipulate them to obtain any desired quantitative relationship. Understand the extension of these equations to the quantum realm (wave-particle duality) for free particles, atoms and nuclei. Generalize the concepts underlying the equations, such as restoring force, inertia, and energy.
- Apply the equations governing oscillations and waves to mechanical systems for various boundary conditions, to optical systems, and to quantum physics in atomic and nuclear systems. Calculate unknown quantities based on physical relationships, boundary conditions, and known quantities.
- Analyze graphs of oscillatory and wave phenomena to obtain wavelength, frequency, amplitude, phase, particle and wave position, velocity, acceleration, damping time constant, as a function of time. Identify and distinguish types of wave motion such as transverse, longitudinal, standing waves, reflection, and refraction.
- Evaluate the soundness and precision of your answers. Explain and interpret your solutions to problems in a way that shows deeper understanding. Identify and appraise the range of applicability of your results, and their limitations.

TOPIC	TEXT STUDIES
Week 1 Oscillations and Waves	Chapter 14 – Sections 1-3, 5-8 Chapter 15 – Sections 1-8
Week 2 Sound	Chapter 16 – Sections 1-5, 6-8
Week 3 Light	(Chapter 32 – Sections 1-3) Chapter 33 – Sections 1-7
Week 4 Geometric Optics	Chapter 34 – Sections 1-4
Week 5 Interference	Chapter 35 – Sections 1-4

Week 6 Diffraction	Chapter 36 – Section 1-7
Week 7 Relativity	Chapter 37 – Sections 1-8
Week 8 Photons	Chapter 38 – Sections 1-4
Week 9 Particles and Waves	Chapter 39 – Sections 1-6
Week 10 Quantum Mechanics	Chapter 40 – Sections 1-5
Week 11 Atomic Structure	Chapter 41 – Sections 1-6
Week 12 Molecules and Condensed Matter	Chapter 42 – Sections 1-3
Week 13 Band Structure, PN Junction, & Transistors	Chapter 42 – Sections 4-7

***FIRST DAY OF CLASSES: Tuesday, September 3***

***LAST DAY TO WITHDRAW: Monday, November 11***

***Thursday Classes Meet: Tuesday, November 26***

***Friday Classes Meet: Wednesday, November 27***

***THANKSGIVING RECESS: November 28 – December 1***

***LAST DAY OF CLASSES: Wednesday, December 11***

***READING DAYS: Thursday, December 12; Friday, December 13***

***FINAL EXAM PERIOD: December 15 – December 21***

***FINAL GRADES DUE: December 23***