New Jersey Institute of Technology

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Fall 2021

PHYS 234-HM1: Physics III Honors

Andres Jerez

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Instructor: **Andres Jerez**:   **jerez@njit.edu**

Lecture Times: Mondays and Wednesdays, 1:00 PM – 2:20 PM, FMH 108

Office hours: Mondays, 10:00 AM – 11:00 AM, 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 enroll in the course specified by the instructor by obtaining access to <u>Mastering Physics for University Physics with Modern Physics, **15th** edition, Young and Freedman, Pearson (June 14th 2019) - Copyright © 2020</u>. There are several purchase options based on duration and whether or not the e-book is included. Please see this link https://www.pearson.com/store/p/university-physics-with-modern-physics/P100002510958
  Here are the instructor and course information needed for registration (*See below for instructions on how to register for this particular section)*:
  - Instructor's Course ID: jerez48445
  - Course Name: PHYS III 234 HM1, Fall 2021

  Assignments will be posted online in Mastering Physics. Students login, solve the assigned problems, and submit answers to the automated grading system.
- **Textbooks:** The homework and the structure of the course follows <u>University Physics with Modern Physics, **15th** edition, Young and Freedman, Pearson</u>, 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).

ELEMENTS OF THE COURSE:

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 yours 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:

<u>Common Exams</u>   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, September 27th   4:15 – 5:45 PM
- Common Exam 2: Monday, October 18th   4:15 – 5:45 PM
- Common Exam 3: Monday, November 22nd   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 - (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** (see above).

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

GRADING: Your final letter grade in Phys 234 will be based on a composite score for term's work that includes the quizzes, the common exams, the final exam, the homework, and the templates.

Final Letter Grades: Here are the weights to be used for calculating the composite score:

- **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 10th

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.*

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

To register for PHYS III 234 101, Fall 2021:

1. Go to https://www.pearson.com/mastering.
2. Under Register, select **Student**.
3. Confirm you have the information needed, then select **OK! Register now**.
4. Enter your instructor's course ID: jerez48445 and **Continue**.
5. Enter your existing Pearson account **username** and **password** to **Sign In**. You have an account if you have ever used a MyLab or Mastering product.
   • If you don't have an account, select **Create** and complete the required fields.
6. Select an access option.
   • Enter the access code that came with your textbook or that you purchased separately from the bookstore.
   • If available for your course,
      • Buy access using a credit card or PayPal.
      • Get temporary access.
   If you're taking another semester of a course, you skip this step.
7. From the You're Done! page, select **Go To My Courses**.
8. On the My Courses page, select the course name **PHYS III 234 HM1, Fall 2021** to start your work.

To sign in later:
1. Go to https://www.pearson.com/mastering.
2. Select **Sign In**.
3. Enter your Pearson account **username** and **password,** and **Sign In**.
4. Select the course name **PHYS III 234 HM1, Fall 2021** to start your work.

To upgrade temporary access to full access:
1. Go to https://www.pearson.com/mastering.
2. Select **Sign In**.
3. Enter your Pearson account **username** and **password,** and **Sign In**.
4. Select **Upgrade access** for **PHYS III 234 HM1, Spring 2021**.
5. Enter an access code or buy access with a credit card or PayPal.

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	(Chapt. 32 – Sections 1-3) Chapt. 33 – Sections 1-7
Week 4 Geometric Optics	Chapt. 34 – Sections 1-4
Week 5 Interference	Chapt. 35 – Sections 1-4
Week 6 Diffraction	Chapt. 36 – Section 1-7
Week 7 Relativity	Chapt. 37 – Sections 1-8
Week 8 Photons	Chapt. 38 – Sections 1-4
Week 9 Particles and Waves	Chapt. 39 – Sections 1-6
Week 10 Quantum Mechanics	Chapt. 40 – Sections 1-5
Week 11 Atomic Structure	Chapt. 41 – Sections 1-6
Week 12 Molecules and Condensed Matter	Chap. 42 – Sections 1-3
Week 13 Band Structure, PN Junction, & Transistors	Chap. 42 – Sections 4-7

Memorial day (no lecture): Monday, September 6
Wednesday, September 8, follows Monday Schedule
LAST DAY TO WITHDRAW: Wednesday, November 10
LAST DAY OF CLASSES: Friday, December 10
READING DAYS: December 13, 14
FINAL EXAM PERIOD: December 15 – December 21