Fall 2019

PHYS 234-001: Physics III

Andres Jerez

Recommended Citation

Instructor: **Andres Jerez**: 455 Tiernan Hall**, jerez@njit.edu**

Lecture Times: Wednesdays and Fridays, 10:00 AM – 11:20 AM, FMH 110

Office hours: M 10:00 AM – 11:00 AM & W 1:00 PM – 2:00 PM; other times 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 with Pearson eText -- Standalone Access Card -- for University Physics with Modern Physics (by Young & Freedman), **13th edition**, ISBN: 9780321741257. *Note*: only the card for the 13th edition will allow you the access to the homework; similarly you must register and login through **www.masteringphysics.com** (other addresses, even from the same publisher, can take you to the wrong course).
- If you would like to get a hardcopy of the book, it may have to be a used one, since the 13th edition of the textbook is currently out of print. *In this course, we will cover Chapters 14-16, and 33-43.*
- **Mastering Physics Homework System:** Each student must enroll in the course specified by the instructor. Homework assignments will be posted on-line. Students login, download and solve the assigned problems, and submit answers to the automated grading system.

ATTENDANCE: 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."

HELP: Contact your instructor if you are having trouble with the course; do not simply hope for a miracle and fall further behind. The Physics Dept. office on the 4th floor of Tiernan has specific information on tutoring. Physics tutoring is available through the CAPE organization, and possibly elsewhere.

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

1) Common Exams   Three common exams will be given during the semester. The exam schedule is:

- Common Exam 1: Monday, October 7th   4:15 – 5:45 PM, Location TBA
- Common Exam 2: Monday, October 28th   4:15 – 5:45 PM, Location TBA
- Common Exam 3: Monday, November 18th   4:15 – 5:45 PM, Location TBA

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.

2) <u>Homework:</u> Homework assignments will be posted on-line using the Mastering Physics Homework System**:** **www.masteringphysics.com**. Please use the following course ID (no quotes): "PHYS234001FA19". Homework due dates will be announced. The recommended problems from the text (see the syllabus below) will be discussed during the recitation class.

3) <u>Final Exam</u>: TBA

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

- **60%** for all three common exams (20% each)
- **30%** for the final exam
- **10%** for the total of homework work

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 %

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

<u>HONOR CODE STATEMENT:</u> 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.**

Turn off all cellular phones, wireless devices, computers, and messaging devices of all kinds during classes and exams. Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors. Creating noise or otherwise interfering with the work of the class will not be tolerated.

5) 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	RECOMMENDED PRACTICE PROBLEMS
Week 1 Oscillations and Waves	Chapt.14 – Sections 1-7 & Chapt. 15 – Sections 1-8	pg. 463 – 3, 4, 9, 19, 27, 45, 48 pg. 500 – 1, 7, 8, 12, 18, 24, 42, 44
Week 2 Sound	Chapt. 16 – Sections 1-8	pg. 543 – 1, 9, 15, 25, 29, 39, 45, 50
Week 3 Light	Chapt. 33 – Sections 1-5	pg. 1107 – 1, 5, 9, 11, 17, 19, 25, 31, 33, 36
Week 4 Geometric Optics	Chapt. 34 – Sections 1-4	pg. 1154 – 1, 5, 9, 15, 17, 20, 25, 27, 31, 43
Week 5 Interference	Chapt. 35 – Sections 1-5	pg. 1184 – 5, 9, 13, 17, 19, 21, 25, 29, 30, 31
Week 6 Diffraction	Chapt. 36 – Section 1-7	pg. 1216 – 1, 3, 13, 15, 25, 29, 39, 45, 47
Week 7 Relativity	Chapt. 37 – Sections 1-8	pg. 1254 – 5, 10, 15, 19, 22, 24, 27, 33
Week 8 Photons	Chapt. 38 – Sections 1-4	pg. 1282 – 3, 5, 7, 11, 15, 17, 19, 25, 27
Week 9 Particles and Waves	Chapt. 39 – Sections 1-6	pg. 1320 – 1, 8, 17, 22, 27, 29, 41, 43, 52
Week 10 Quantum Mechanics	Chapt. 40 – Sections 1-5	pg. 1357 – 1, 5, 10, 14, 33, 40, 42
Week 11 Atomic Structure	Chapt. 41 – Sections 1-7	pg. 1399 – 1, 7, 13, 19, 22, 28, 34
Week 12 Molecules and Condensed Matter	Chap. 42 – Sections 1-3	pg. 1433 – 1, 5, 8, 12, 16, 17, 19, 20
Week 13 Band Structure, PN Junction, & Transistors	Chap. 42 – Sections 4-7	Pg. 1433 – 23, 26, 27, 28, 29, 30, 31, 32, 33, 34
Week 14 Nuclear Physics	Chap. 43 – Sections 1-8	pg. 1474 – 1, 6, 13, 19, 21, 39

THANKSGIVING BREAK: November 28 – December 1
Wednesday, November 27 follows Friday Schedule: THERE WILL BE LECTURE
READING DAY: Friday, December 13
FINAL EXAM PERIOD: December 14 – December 20