

Spring 2016 Physics 111: Introduction to Mechanics, Waves, and Heat

Location: HN 1311

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Lecture Times:
Mo and Th: 9.45am – 11.00am

Recitation:
Th 8.50am—9.40am

Office hours: Mo and Th: 11am--noon
or, by appointment.

Pre-requisites:
MATH 150
Facility with algebra, calculus, trigonometry
and some geometry.

Text: *Fundamentals of Physics*, by Halliday, Resnick, and Walker, 10th Ed. (Wiley, 2014). But earlier editions, which you might obtain less expensively, could also be fine. There will be recommended self-graded homework problems taken from the book, and problems worked through in small groups during recitation.

Grading:

✓ Quizzes & Homework	10%	(15mins, during recitation)
✓ 2 Midterm Exams	20% x 2	(tentatively Mar 6 th and Apr 24 th)
✓ Final Exam	35%	(TBA, during week of May 22 nd)
✓ Laboratory	15%	(register separately for LB)

Syllabus:

You will learn in some depth about the following topics that lie at the foundation of classical physics: kinematics, forces, energy and momentum, conservation laws, rotational motion, torques, simple harmonic motion, waves, and thermodynamics. By the end of the course, you will be able to: (i) analyze, explain, and calculate displacement, velocity, momentum, and acceleration in linear and rotational motion, including the use of vectors in three dimensions, (ii) identify forces and torques acting on objects, calculate the work done by them and the consequent motion of the object, and apply Newton's Laws, (iii) classify different forms of energy, and use the principle of conservation of energy and the work-energy theorem to solve problems, (iv) identify and use impulse and momentum conservation in solving collision problems, (v) analyze gravitational forces and apply Kepler's laws, (vi) describe oscillatory and wave motion and compute phenomena such as the Doppler effect, (vii) define and calculate concepts relevant to thermodynamics such as temperature, heat, and thermal expansion, and apply the first and second laws of thermodynamics (if time allows).

The specific chapters that will be covered in the course are on the following page.

Topic	Book chapter
Motion Along a Straight Line	2
Vectors	3
Motion in Two and Three Dimensions	4
Force and Motion I	5
Force and Motion II	6
Kinetic Energy and Work	7
Potential Energy and Conservation of Energy	8
Center of Mass and Linear Momentum	9
Rotation	10
Rolling, Torque, and Angular Momentum	11
Gravitation	13
Oscillations	15
Waves I	16
Waves II	17
Temperature, Heat, and the First Law of Thermodynamics	18
The Kinetic Theory of Gases	19
Entropy and the Second Law of Thermodynamics	20

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Neepa Maitra, Professor, Department of Physics and Astronomy, Hunter College CUNY, Jan 2017.