

**Physics I Lab (1230L & 1310L) Syllabus** UNM-Valencia Fall 2023 Tuesdays 12 noon -2:45p Room A126

*Professor:* Clifton Murray (Mr., Professor, Dr.)

Instructor's Office hours MW 1:30-3:15p, 5:15-5:45p; T 4:15-5:15p; Th 11:45a-12:15p, 4:15-5:45p,

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*Pre- or co-requisite:* Algebra- or Calc-based Physics I (1230 or 1510)

*Course Purpose & Description:* Physics I Lab consists primarily of hands-on experiments designed to give the student a more intuitive grasp of topics discussed in class. The lab also gives the students the opportunity to test some physics principles for themselves, by measurement, direct observation or experience. Laboratory work also provides the student with the ability to correctly use measuring instruments, and with skill at propagating measured values and units through mathematical calculations. At the instructor's discretion, extra lab time may occasionally be used to answer questions from lecture, for recitation (practice problems), and/or as "overtime" for tests from physics lecture. But there will always be some hands-on lab work at the first of the lab period.

*Credit Hours:* 1.0 credit hour. The labs are structured such that you should be able to complete the lab work, including written reports when required, within the 2 hour and 45-minute lab period.

*Course learning objectives:* By semester's end, the student with a B or higher grade should be able to perform at least 12 of the following activities, including the bold-numbered items:

- 1) read analog instruments, including the meter stick, Vernier caliper, and mass scale, to correct precision.
- 2) correctly propagate measurements through calculations.
- 3) test, by experiment, certain formulas describing velocity and acceleration, and experience these phenomena directly,
- 4) use appropriate formulae and equipment to measure the acceleration of gravity (free-fall).
- 5) design and conduct an experiment to test the theory of ideal two-dimensional projectile motion.
- 6) test the 2<sup>nd</sup> law of motion by applying it to physical situations involving net force and acceleration.
- 7) calculate gravitational potential energy, power, and work from measurements taken of an actual physical process.
- 8) test the principle of conservation of mechanical energy in a low-friction environment.
- 9) find the coefficient of friction between two materials multiple ways, and in doing so confirm some of the analytical techniques which can be used for this purpose.
- 10) determine by experiment whether momentum and energy are conserved through elastic and inelastic collisions, respectively.
- 11) directly produce a centripetal force, and calculate centripetal force and acceleration.
- 12) directly experience effects of the law of conservation of angular momentum, and explain the behavior of selected rotating objects—including the students themselves--using that principle.
- 13) observe by measurement thermal energy transfer between materials, and test the veracity of formulas describing that transfer.
- 14) predict the period and frequency of a spring-mass oscillator and of a pendulum
- 15) determine the acceleration of gravity using a simple pendulum and its theory, and in so doing confirm the Simple-pendulum period formula.
- 16) Via written reports, communicate the scientific reasoning used and results found in lab investigations.

The professor reserves the right to create new laboratory exercises, based upon inspiration and/or new equipment availability. These may supplant non-boldface items in the above list. But any such new labs will either parallel or complement topics studied in lecture.

*Academic dishonesty*, including copying from another student's lab without having attended the activity, will be cause for a lowered grade or being dropped from the course.

*Disruptive or unruly behavior*, such as ridiculing another student or the instructor, will result in being expelled from the class.

*Disability:* If you have a disability which could interfere with doing lab activities remotely, contact UNM-Valencia Campus Student Services, 505-925-8560, <https://valencia.unm.edu/students/student-services.html>

Any harassment or discrimination based on gender observed by the professor or brought to his attention will be reported to UNM's Office of Equal Opportunity and Title IX Coordinator. For information on what comprises sexual misconduct, see <http://policy.unm.edu/university-policies/2000/2740.html>

*Lab Turn-In:* Lab handouts with reports (if applicable) are due by the end of each lab, viz. no later than 2:45p.

*Grading:* Each lab will be accompanied by a worksheet handout, which will outline theory and procedures, and which will contain space for showing measurements, reasoning, calculations, and answering questions. The professor will go over the worksheet before actual measurement, data recording, calculations, etc. begin. The worksheet will be turned in at the end of the lab for scoring. The score is based on the worksheet as well as lab attendance and participation.

The overall course grade will be determined according to the following points-earned scheme, given here as a percentage::

$97.5 \leq x \leq 100\%$	A+	(unless a lab is missed.)
$92.5 \leq x < 97.5$	A	
$90 \leq x < 92.5$	A-	
$87.5 \leq x < 90$	B+	
$82.5 \leq x < 87.5$	B	
$80 \leq x < 82.5$	B-	
$77.5 \leq x < 80$	C+	
$72.5 \leq x < 77.5$	C	
$70 \leq x < 72.5$	C- *	
$60 \leq x < 70$	D	
Below 60%	F	

\*Note that a C- grade may not satisfy the prerequisite for a course or degree. It is your responsibility to know whether this applies to your situation.

\*\*No incomplete ("I") grades will be given.