

Instructor: Clifton Murray

Available M 2:45-3:15p,5:15-5:30p; T 4:15-5:30p; W 2:45-3:15p,5:15-5:30p; Th 11:45a-12:15p,1:15-2:45p,4:15-5:30p

wcmurray@unm.edu 505-925-8727

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

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 lecture. The lab also gives the students the opportunity to test 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 with units through mathematical calculations.

At the instructor's discretion, lab time may occasionally be used to answer questions from lecture, for recitation (practice problems), and/or as "overtime" for tests from physics lecture.

Course learning objectives: By semester's end, the student with a B or higher grade should be able to demonstrate she/he can 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 the correct precision.
- 2)** correctly propagate measurements through calculations .
- 3)** test, by experiment, 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 2nd 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 themselves--using that principle.
- 13)** observe by measurement thermal energy transfer between material, 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 veracity of the pendulum formula.
- 16)** Via written report, communicate the scientific reasoning and results used and found in lab investigations.

The instructor reserves the right to create new laboratory exercises, based upon inspiration and/or new equipment availability and/or pandemic conditions . 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 another student's lab, 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.

Any harassment or discrimination based on gender, brought to the Instructor's 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> Note that students at UNM-Valencia are expected to attend "Grey Area" seminars, offered at various times on campus.

Lab Turn-In: Lab handouts and/or reports normally should be turned in by 5:00p on the day of the lab class.

Grading: Each lab will be accompanied by a worksheet, which will outline theory and procedures, and which will contain space for showing measurements, reasoning, calculations, and answering questions. The worksheet will be turned in at the end of the lab for grading.

Individual labs, lab reports, and the overall course grade will be determined according to the following points-earned scheme:

$97.5 \leq x \leq 100\%$	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 particular situation.

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

In case of a University shut-down, labs will continue online. The tentative plan will be to meet students on campus every 2-3 weeks and issue them lab equipment. The lab class will be conducted weekly at the usual time, but via Zoom.