Physics II Lab (1240L&1320L) **Syllabus** UNM-Valencia **Spring 2026** Tuesdays, Noon-2:45p

1 credit hour. Expect to spend at least 3 hours performing the lab, analyzing data, and writing a lab report.

Instructor: Clifton Murray (Professor, Mr., Dr.) wcmurray@unm.edu, 505-925-8727
Available Office times: Wed 11a-2:15p; Thursday 11:45a-12:15p, 2:00-2:45p

Pre- or Co-requisite: Physics II "lecture" (Phys1240 or Phys1320)

Course Purpose & Description: Physics II Lab consists primarily of hands-on experiments designed to give the student (1) a more intuitive grasp of topics discussed in lecture, (2) the opportunity to test physics principles for themselves by measurement (or in some cases, by direct observation or experience), (3) the ability to correctly use electrical measuring instruments, and (4) increased skill at propagating measured values and units through mathematical calculations.

Lab Topics and Student Learning Objectives (SLO's): By semester's end, the student with a B or higher grade should be able to demonstrate that she/he can perform all of the boldfaced items below, plus selected others from the list, depending on equipment availability &/or instructor or student inspiration. The lab topics are listed in the approximate order in which they will occur.

1) Illustrate the law of charges, using simple electrostatic apparatus.
2) Explain why a charged object can attract an uncharged object, in terms of Coulomb's law, and illustrate the phenomenon with a simple electrostatic experiment.
3) Use a multimeter, in ohmmeter, voltmeter, or ammeter mode as appropriate, for measuring resistance, voltage, and current.
4) Explain, and convert as needed for calculations, the units for resistance, voltage, and current.
5) Construct a simple d.c. circuit given the necessary components.
6) Correctly measure R, V, and I in an actual simple circuit.
7) Given two of the three quantities in a d.c. circuit, predict the 3rd quantity to within a reasonable uncertainty, i.e, be able to analyze the circuit using V = I R
8) Construct a resistors-in-series circuit, predict the resistance, voltage, and current anywhere in the circuit, and confirm the predictions by appropriate measurement.
9) Construct a resistors-in-parallel circuit, predict the resistance, voltage, and current anywhere in the circuit, and confirm the predictions by appropriate measurement.
10) Define Capacitance both qualitatively and quantitatively.
11) Calculate the capacitance of an actual parallel-plate capacitor from it's physical dimensions, apply a voltage across it, then compute the charge on each plate using C = Q / V.
12) Predict the time constant of a charging and/or discharging RC circuit, then test the prediction experimentally by measurement.
13) Explain the Law of Poles in magnetism.
14) Illustrate the effect of a magnetic field on moving charge, by using it to deflect an electron beam..
15) Illustrate how moving charge—i.e., current—can be induced by moving a conductor through a magnetic field.
16) Illustrate how changing the magnetic flux through a loop conductor can induce an emf, and hence a current around the conductor.
17) Demonstrate an understanding of the basic controls on an oscilloscope, by acquiring a stable pattern on its display of an alternating voltage.
18) Set up and obtain a desired a.c. voltage from a signal generator, display the signal, and analyze the display for peak voltages, rms voltages, and frequency.
19) Explain that electric meters applied to a.c. measure rms voltage and current.
20) Modern Physics: Determine the charge to mass ratio of the electron, experimentally.
21) Modern Physics: Determine Planck's constant experimentally.
22) Assuming 3.0 X 10^6 V/m as the breakdown field, determine the voltage produced for maximum spark by a Van de Graaf generator.

The instructor reserves the right to create new laboratory exercises based upon equipment availability and/or inspiration, which may supplant non-boldface items in that list. Any such new labs will parallel and/or complement topics studied in lecture.

A *Lab Report* will be required in some of the labs, and will be part of the lab score.

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, or intentional rough handling of/damage to lab equipment, will result in being expelled from the class.

Title IX Updated Spring 2025 Syllabus Language to substitute for "Title IX" language:

Our classroom and university should always be spaces of mutual respect, kindness, and support, without fear of discrimination, harassment, or violence. If you ever need assistance or have concerns about incidents that violate this principle, please access campus support resources. These include confidential services at LoboRESPECT Advocacy Center, the Women's Resource Center, and the LGBTQ Resource Center. The University of New Mexico prohibits discrimination on the basis of sex (including gender, sex stereotyping, gender expression, and gender identity). UNM faculty and graduate teaching assistants are considered "responsible employees." "Responsible employees" must communicate reports of sexual harassment, sexual misconduct and sexual violence to Compliance, Ethics and Equal Opportunity. For more information on the campus policy regarding sexual misconduct, reporting, and reporting for "responsible employees," please see UAP 2720 and UAP 2740.

Accommodations: UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact the UNM-Valencia Equal Access Services (Sarah Clawson, Coordinator), at (505) 925-8840 or by email at sjclawson@unm.edu. Or the UNM-Albuquerque Accessibility Resource Center (https://arc.unm.edu/) at arcsrvs@unm.edu or by phone at 505-277-3506.

COVID-19 Health and Awareness. UNM is a mask friendly, but not a mask required, community. If you are experiencing COVID-19 symptoms, please do not come to class. If you do need to stay home, please communicate with me at wcmurray@unm.edu ; I can work with you to provide alternatives for course participation and completion. Let me, an advisor, or another UNM staff member know that you need support so that we can connect you to the right resources. Please be aware that UNM will publish information on websites and email about any changes to our public health status and community response.

Default policy is **no makeup labs**. If unavoidable circumstances force you to miss a lab, notify and explain to the instructor ASAP—depending on circumstances, a makeup might be doable at semester's end. Otherwise, note that if a lab is missed, the score for that lab is zero and the student cannot receive an A+. However, the lowest score will be dropped at semester's end, so if circumstances force you to miss one lab, that zero will be the one (and only) score dropped, so you can still receive as high as an A for the course.

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 after the lab class for scoring.

Grades for labs, lab reports, and the overall course will be determined according to the following scheme:

$97.5 \leq x < 100\%$	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-	*note that a C- might not meet the prerequisites for some courses or programs
$60 \leq x < 70$	D	
Below 60%	F	

No Incomplete (I) grades will be given.