Physics II Lab (152L & 161L) **Syllabus** UNM-VC **Spring 2016** Tuesdays, noon-2:45p room A126

Instructor: Clifton Murray
Office A126A. Hours: MW 3:15-4:15p, T 4:15-5:30p, Th 11:45a-12:30p, 1:15-2:45p, 4:15-6:15p.

Pre- or Co-requisite: Physics 152 or 161

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) 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 more from the list depending on equipment availability &/or instructor or student inspiration:

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 3.0×10^6 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 not be mentioned above, and which may supplant non-boldface items in that list. Any such new labs, will either parallel or complement topics studied in lecture.

A few labs may require a lab report; in that case, there will be time available during the lab period to write it.

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.

**No text messaging or cell phone calls* in classroom. Phones may, however, be used as a tool during some labs*

Any *sexual misconduct or gender discrimination* that comes to the attention of any UNM Faculty member, TA, or GA must, per UNM policy, be reported to the UNM Office of Equal Opportunity and the Title IX Coordinator. For information regarding campus policy on sexual misconduct, refer to https://policy.unm.edu/university-policies/2000/2740.html

Disability: If you have a documented disability, please provide a letter from Equal Access Services as soon as possible, to ensure that appropriate accommodations are made in a timely manner.

There will be **no makeup labs**; 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 a lab, that zero will be the one (and only) score dropped, and you can still receive as high as an A grade 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 at the end of the lab for grading.

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-	
$60 \leq x < 70$	D	
Below 60%	F	