

Introduction to Physics 4BL

Other source materials: the course syllabus, instructor's manual, and lab manual.

The Physics 4BL course description in the UCLA General Catalog:

Laboratory, three hours. Enforced requisites: courses 1A, 1B, and 1C (corequisite), or 2AH, 2BH, and 17 (corequisite), 4AL. Experiments on electric forces, fields, and potentials. Magnetic fields. Linear and nonlinear devices. Resistors, capacitors, and inductors. Modern circuits. Geometrical and physical optics.

General Comments

There are seven experiments, and the students are expected to take data in all of the experiments. During the week before each lab session, the students fill out a "pre-test" to make sure they have read and somewhat understand the material. The pre-test is made up by each TA for his/her sections, and should be simple, containing 3 to 5 questions based only on the material contained in the lab manual. The completed pre-tests are handed in at the start of each lab session. There are no special make-up sessions, so that if a student misses a section, the only possibility is to attend a later session on the same week with permission of both of the affected TAs. Students take data in pen in a bound lab notebook, which has cross-ruled pages, and the TA should check off and initial the notebooks before the students leave the lab session. Then the students write up a lab report based on the data they have taken. Only five of the seven experiments are written up. The writeup for the last lab of the quarter will have to be done in class and turned in after conducting the experiment, so you may rather encourage the students to write up experiments 1-5, or 2-6, etc. Some students will want to turn in more than 5 reports. This is discouraged by following a policy that only the first 5 reports will be graded, if more than 5 are turned in. During the last session of the quarter, the lab notebooks are handed in to the TAs for grading.

Orientation Week

Besides reviewing the information contained in the Syllabus on lab and grading procedures, it is important for TA's to emphasize to the students:

- **Electrical safety.** It should be emphasized that it takes a combination of high voltage (>50 volts or so) and significant current (mA) to cause a safety hazard. For instance, the Van de Graaf creates up to 50,000 volts, but tiny (μA) currents, and is therefore quite safe. The experiments in this class have been designed with electrical safety in mind. Nonetheless, students need to take care not to stick things into wall outlets, or to tamper with the electrical cords and connections.
- **Preparation.** The pretests are meant to insure adequate preparation, and students who have not read the manual, but copied their pretest answers from others' pretests will be at a significant disadvantage during the lab period.

Conduct of the Lab Session

Be sure to arrive a little early to check the condition of the equipment. Sometimes parts are missing, or equipment will be found in non-working condition. It is much better to discover this before rather than during the session. Equipment problems should be immediately communicated to Rick Morishita or Ron in Kinsey 61 (825-3385). Many times, labs are scheduled immediately after one another, so keep the lab tables well organized so as not to cause inconvenience to the next lab session.

Grading (in general)

The mean grade in the class will be a B, whereas the median grade will be between a B and a B+. (They differ because of a small number of failing or near-failing grades). The TAs assign the student scores, but the final class grades are assigned by the supervising Professor. The scores from each TA are separately normalized. The normalization is accomplished by first removing the outlying (failing) scores from the averages, then by

equalizing the means and the deviations from the mean. The students scores are the sum total of the following factors:

Reports	50% (10% each)
Pre-tests	20%
Lab notebooks	20%
Behavior	10%

The quality of grading of reports and lab notebooks is extremely important, and so each TA must do his or her best to find and note omissions or weaknesses in the reports and lab notebooks.

It is important to maintain uniformity of grading. The average grade on a lab report or lab notebook should be around 80% of the maximum possible. There should also be a good spread between a low grade and high grade. Deviating from these averages causes significant unhappiness among the students. For instance, it is not unusual for a TA to "generously" assign average grades of 90% of the maximum possible. Students who have received such grades expect A's, while a professor who quite normally normalizes by the TA average grade may give them B's. Overly generous grading should thus be strongly discouraged. Likewise, assigning scores which are very close to each other is bad practice: even if the mean is 80%, if the distribution is too narrow, it causes problems. For instance, if most of the class scores are between 78% and 82%, then a score of 76% might be a C-, which would be unduly harsh.

The "behavior" portion of the student score is to be assigned at the TA's discretion. Possible factors are: showing up late for class, leaving the lab table in poor condition at the end of the experiments, unruly behavior in class, or not participating well in the lab work (leaving it to the unfortunate lab partner).

When the scores are submitted to the professor for normalization and grade assignment, each TA should communicate to the professor his or her qualitative assessment of the students as a whole. For example, "this group of students is the best, by far, that I've ever had in three quarters of teaching lower division labs." That helps to put the scores in perspective and allows some deviation from a strictly numbers-based grading system.

Grading laboratory reports

Laboratory reports should not be graded on the basis of thickness or appearance. The TA must read the lab reports and examine them for scientific validity, completeness, and clarity. Lab reports should be understandable in stand-alone form, although reference can be made to the lab manual regarding some of the experimental details. Data must be quoted with uncertainties, and results must include error analysis. Different TA's may grade somewhat differently, but the criteria should be explained to the students in advance.

Grading laboratory notebooks

The students' laboratory notebooks should look similar to what a well-trained professional scientist would produce. It is not supposed to follow a particular format. For instance, it is not necessary to write a paragraph repeating part of the lab manual beginning "Today the purpose of this experiment is..." It IS important that the lab notebook should be scientifically understandable when reviewed after a long time. Neatness is only a small piece of this. It also needs to be explained what the measurements being made represent, what the units are (mm vs. cm, for instance), what the uncertainties in the measurements are. The observations "are what they are" and should not slavishly be forced to agree with theory at this point. Erroneous data may be discarded (by X'ing it out) if a reason can be found for it during the lab period.