225L Lab Policies and TA/Instructor Duties

Uniform lab policies and procedures –
Experiments and write up streamlining and modifications –
Emphasis on adding error and uncertainty analysis where feasible –

Summary of items covered in this document.
(Please read carefully the additional details in the following corresponding sections).

1.) Students turn in lab reports at the end of each lab period as computer files to instructor’s lap top, instructor’s email with specified title format, or to Turn It In on Titanium. (Instructor’s choice, pick one and put on your syllabus)

2.) Limit lectures on lab material to 10-15 minutes, just the bare essentials, no long derivations.

3.) (Optional) Each lab TA/instructor is to submit weekly, 2-3 Questions on each lab experiment that are suitable for final exam and/or pre-lab or quiz questions. These must be submitted no later than the end of the week the lab was performed (i.e. Sunday evening).

4.) A Common Final Exam will be given the very last week of lab and counts 20% of the grade in terms of total points. This will be the same exam for all 225L lab sections, no exceptions.

5.) Grading Policy. Lab grading should be done on a “curve” basis, using the class mean and standard deviation of total points, with typical lab GPA’s in the range of 2.4-3.6. (see example). (no C- grades are to be assigned because of conflicts with NSM and Engineering grade policies), but the policy on if or how to apply plus and minus grading is up to each instructor.

6.) UPS 300.004 (http://www.fullerton.edu/senate/documents/PDF/300/UPS300.004_12-3-13.pdf) requires certain minimum elements for the syllabus. Use the online syllabus at http://physics.fullerton.edu/department/642028 for 225L, with your instructor details filled out.

7.) Students should bring USB/thumb drives for saving a personal copy of their report that was turned in and transferring to instructor PC. Recommend saving as a PDF before turning in.

8.) Instructors are to caution and prevent students from playing with the computers and equipment or making adjustments to equipment at the beginning of lab period. In fact, you can use the new Lab software to shut down the computers while you are lecturing.

9.) Each week the lab instructors are to make sure that they understand any email instructions or modifications to the experiments sent out by Steve Mahrley. Check for email updates daily. Some of the existing write-ups have too many questions for the students to answer and do in the lab period, and it is important that instructors recognize this and eliminate unnecessary elements of the experiment. Please help us shorten and streamline the lab write-ups to the most essential parts. Please send us anything additional you do to incorporate error analysis in the labs.

10.) Instructors will be visited during a lab period for a short time by a full time physics department faculty member who will evaluate their performance as a lab instructor.

8/19/15 KW
1.) Students turn in lab reports at the end of each lab period as computer files to the instructor’s laptop, email with instructor specified email and file titles, or to Turnitin on Titanium depending on the instructor’s preference (specify one on the syllabus). Note that the Titanium option requires the instructor to set up a Titanium account and that Turnitin gives a lot of false positives since many of the reports will have similar wording. One joint report is turned in per pair of students at a lab station. Lab partners receive a common grade for each report, unless one student is absent or leaves early, in which case the instructor should reduce the grade assigned to the person who was late or left early. (see below under final exam to differentiate individual student performance). In cases of absence of a lab partner, or odd number of students in lab, there may be 3 students per lab station, unless the odd person prefers to do the experiment alone. Typing sample calculations and other equations and formulas on the computer is time consuming and not an efficient use of the very limited lab time, so do not require students to do this. They can copy and paste necessary equations from the lab write-up or the internet.

Rationale: The 3 hour lab period is a high impact practice (HIP) time and should involve students in an intensive, collaborative, hands on learning experience. Therefore students shall not be dismissed early once they have taken data. They are to remain in lab and help their partners complete the lab report. Students do not leave early unless their lab report has been completed and turned in online. The lab report is a joint effort, and the work and learning is to be shared. It is not the effort of one taking the data (and leaving), and the other (staying) writing up the report. Students who leave early before the lab report is finished should have their lab report grade reduced.

The lab is only 1 unit and students should not be taking the time to complete the labs at home outside of lab. Outside of lab, resources are available on the internet and from other students to copy lab reports, etc., and this defeats the purpose of getting the students to learn to work together and complete a task in a given period of time. In order to finish the labs by the end of the period, students need to be at least minimally prepared for lab, and completing the labs during the lab period encourages students to come to lab with at least some preparation so that they can finish in time. Turning in lab reports at the end of the period also keeps students more focused and limits time wasting talk having nothing to do with the experiment.

2.) Limit lectures on lab material to 10-15 minutes, just the bare essentials, no long derivations. Since students need to finish the lab write-up by the end of the lab period, it is mandatory that the instructor not take up precious time needed by the students to perform and write up the experiments. If needed as the lab period progresses, short (few minute only) supplementary comments by the instructor can be given if students need additional guidance as a class.

3.) (Optional) Each lab TA/instructor is to submit weekly, 2 Questions on each lab experiment that are suitable for final exam and/or pre-lab or quiz questions. These must be submitted no later than the end of the week the lab was performed (i.e. Sunday evening). We are compiling a Test Bank of pre-lab/quiz and final exam questions for the lab. These questions should be emailed to kwanser@fullerton.edu, smahrley@fullerton.edu, at the end of each week. Be sure
and state the experiment title that the questions go with. It is important that these questions be composed while the experiment is still fresh in your minds.

The questions should be in the form of multiple choice questions with 5 possible answers (you must supply the 5 responses in addition to the questions). The majority of questions should be quantitative, but they can also be conceptual. The questions should cover the 2 or 3 main/most important topics you think students should have learned from the experiment. They should not be too difficult or too simple, since the main purpose is to differentiate between students who were lab partners and received the same grades all semester.

Example Questions (without answers): For the determination of g experiment;

1.) How was the value for g determined?
2.) What was the most important factor limiting the accuracy of the determination of g, the acceleration of gravity?
3.) What is a histogram? (alternate; what can be learned from a histogram?).
4.) What is the standard deviation of a set of measurements? How is it calculated? Calculate the mean and standard deviation of a set of 5 given values (make them differ by about 10-20%)

4.) A Common Final Exam will be given the very last week of lab and counts 20% of the grade in terms of total points. This will be the same exam for all lab sections, no exceptions. The final exam questions will be selected from the test bank of questions prepared by the lab instructors and lab coordinators. To prevent cheating by lab partners, students should not be sitting next to their usual lab partners when taking the final exam. The main purpose of the final exam is to differentiate grades among individual lab partners, since lab partners are given the same grade on their lab reports. In addition, we want to assess all lab sections with the same questions.

5.) Grading Policy. Lab grading should be done on a “curve” basis, using the class mean and standard deviation of total points, with typical lab GPA’s in the range of 2.2-3.4. This does not mean fitting to a Gaussian curve, since course grade distributions are notoriously non-Gaussian, but rather the judicious use of the mean and standard deviations to define grade ranges (see example “curve grading” below). Plus and minus grading may be used in borderline cases (no C- grades are to be assigned because of conflicts with NSM and Engineering grade policies), but the policy on how to apply plus and minus grading is up to each instructor. Lab reports should be graded on a 0-10 scale, with at least 0.5 increments, i.e. 7, 7.5, 8, 8.5, etc. This gives sufficient resolution to discriminate high B and low B, high and low A, etc. It also makes grading easier and more uniform for the instructor by not having to split hairs deciding 8.3 vs. 8.2, etc. The final exam will count 20% of the total points available to the class.

An example of assigning “curve” grades using the mean and standard deviation to determine grade ranges follows.
These grade cutoff values in terms of \([\text{average} \pm (\text{cutoff number}) \times \text{std. dev.}]\) are usually a very good first approximation to assigning grades, assuming the instructor has not been giving only 9’s and 10’s on lab report grades. Individual instructors should “fine tune” these grade cutoffs as needed to achieve a reasonable class GPA and grade distribution. (e.g. A > +1.2 sigma instead of +1.3 sigma). Here sigma is the standard deviation. *If the spread in final grade total points is less than 10% (i.e. the total points histogram is too narrow), the instructor will have to use a different method to assign grades, one more similar to an absolute scale, but with the instructor using discretion as to the maximum and minimum grade cutoff values and reasonable course GPA.*

6.) UPS 300.004 (http://www.fullerton.edu/senate/documents/PDF/300/UPS300.004_12-3-13.pdf) requires certain minimum elements for the syllabus. Use the online syllabus at http://physics.fullerton.edu/department/642028 for 225L, with your instructor details filled out. Class lab report format, lab experiment schedule, lab write-ups, and links are available at http://physics.fullerton.edu/department/295. Final exam for all 225L sections is the last week of the regular semester during the lab period.

7.) Again, remind students to bring USB “thumb” drives to make a copy of their labs. **It is important that students should not leave copies of their lab reports on the computer after they are done, (otherwise the next class will have a finished lab report to turn in!)** Be sure to tell the students that computers will be cleared of any student files without warning.

8.) Instructors are to caution and prevent students from playing with the computers and equipment or making adjustments to equipment at the beginning of lab period. In fact, you can use the new Lab software to shut down the computers while you are lecturing. Students have a tendency to play with things that move, and can damage equipment (especially while the instructor is lecturing on the board). An example is the physical pendulum and its expensive pulley, which students like to play with and spin as a propeller. They also try to align the rod to make it vertical by pulling on it, thus exerting a (damaging) bending torque on the pulley shaft.

9.) Each week the lab instructors are to make sure that they understand any email instructions or modifications to the experiments sent out by Steve Mahrley. The lab experiments and write-ups are in the process of being modified and streamlined (to allow completion in the 3 hour time frame), and we need your help with this process. This is especially the case with introducing elements of the theory of errors in the labs. Last semester two new experiments and associated zero order write-ups were introduced to the lab. This necessitated less than ideal lab write-ups and this semester we need the next iteration of modifications to improve the lab write-ups.
Instructors should communicate weekly with the department staff lab physicist Steve Mahrley to make sure that they understand the experimental apparatus and what the students are to do. *Some of the existing write-ups have too many questions for the students to answer and do in the lab period, and it is important that instructors recognize this and eliminate unnecessary elements of the experiment.* Often this will be communicated to you in the form of an email, that will arrive only shortly before the first lab period for the week, so please check and read your emails daily.

10.) Instructors will be visited during a lab period for a short time by a full time physics department faculty member who will evaluate their performance as a lab instructor. This is required by university policy and the resulting written form is used in personnel decisions such as rehiring, TA assignments, etc.