INTRODUCTION TO PHYSICS 107
INTRODUCTORY APPLIED PHYSICS LAB: MECHANICS
AND THERMODYNAMICS

What do we do in Physics 107?
Physics 107 is a lab designed to support the Physics 105 lecture. Hopefully, the experiments
presented here will develop a greater conceptual understanding of mechanics and thermodynamics.
In addition it will give you a more physical experience with the material, skills in measuring and
analyzing physical data, and experience with measurement equipment.

Adding and Dropping
Adding and dropping (including section changes) are done through AIM through the entire add and
drop period of the semester. Please be aware of the fees associated with such changes. Also, please
make any changes that you need to make as early as possible so that other students
can get into the class. Any special circumstances will be considered by Dr. Christensen on the last day of the add
period (May 7).

Preparing for the lab
Read each lab before coming to class. Review the physics involved and get a general idea of what
you will do. In the manual you will find an answer sheet for each lab. On that sheet there is a space
to write an overview paragraph of the lab. Your lab instructor will check this overview before
you begin the lab. Because you can’t see the equipment before coming to lab you won’t
understand the details of how some equipment works. The purpose of the overview is to ensure that
you are properly prepared to make optimal use of your time in the laboratory—performing the
experiment. In the overview paragraph we are looking for a good conceptual understanding of what
physical principles the lab is supposed to illustrate and how the activities in the lab do that. We are
not looking for a restatement of what is going to be done.

At the beginning of each lab
Your instructor will show you the equipment and explain how it works. He or she will not discuss
the physical principles or laws much; you will already have reviewed them before coming to the lab.
You should be organized into groups of three or four lab partners. You will work together in taking
data and discussing it, but you will each write your own results and analysis. Make sure the
instructor sees and initials your overview paragraph at the beginning of the class period.

Use of lab time
We don’t want you to feel hurried in the lab. It’s hard to think creatively or carefully, or to enjoy
learning if you’re feeling pressured for time. In addition, experiments seldom go as planned;
technical difficulties will arise. (Welcome to the real world!) Attention will be paid to the quality
of the work you do perform, and how earnest your effort is. If you do not complete your lab, but
you have been making an honest effort (your TA will know!) it will not affect your grade. If you do
not complete the lab and you have been goofing off, it will affect your grade. There is always plenty
to do in the lab, so we expect you to arrive on time and to use your time well. You will be graded
on how well you think about and describe what you see and learn. If you come late, leave early, or
simply waste time, it will hurt your grade.

This is a one credit-hour class. A one-credit hour class at BYU is interpreted as 3 to 4 hours of
work per week during a full semester, twice that during Spring or Summer Term.

Getting help in the lab
Your instructor will help you to understand and use the equipment. Your instructor will help you
solve problems you have in taking data, graphing it on the computer, and curve fitting. Ask for help
if you have difficulty doing the experiment.
However, when you don’t understand your results and the physics (and that may be most of the time), **talk to your lab partners.** Take your time to talk it over and try to figure it out. You might consult your text. If your lab group can’t make sense of it, ask other class members. We want you to have the experience of discussing and thinking about these concepts among yourselves because that is one of the best ways to learn these things. We’ve asked your TA **not** to answer your questions about the physics too quickly during the lab.

**Lab reports**

Lab reports are due at the end of the Lab period and you are to give them to your instructor before leaving. You will have time in class to complete the answer sheet associated with each lab. You can often write most of the report as you do the experiments. We have found that students over-invest their time in the class if the reports go home with them (again, this is a one-credit-hour course). Instead, we wish you to write while the experience is fresh.

The reports are informal and hand written. If you concentrate on the quality of what you write, you shouldn’t have to write too much. **Remember the purpose of everything you write is to communicate either what you know or what you learned.** Keep your reports concise and focused. Avoid redundancy; we are fully aware of the procedure so **do not repeat to us the steps of the experiment** -- this will detract from your grade. Write your measurements *(including units!)*, observations and results. Discuss in your own words your findings. Include tables, graphs, and computer printouts, but be very careful that you **label, identify, and explain** what you see in them. **Be sure to include on graphs what each axis represents and their units,** as well as what the graph is telling you. Communicate clearly your interpretation of the graph.

Make sure you write your name, date, the lab, and your section number on your report.

**Making up missed labs**

If you miss one lab your grade will drop by **one** category *(e.g. from A- to B+)* from what your grade would otherwise be based on the labs you completed. If you miss two or three extra labs, your grade will drop by **three** and **five** grade categories, respectively. If you miss more than that, you will have to repeat the course.

If you must miss a lab, you can make up a lab by attending another section doing the **same** lab (once the lab equipment is taken down it’s **too late**). Contact your TA **first** for permission. If you can’t reach your TA, call or email Clark Christensen (422-2207, N482 ESC, cgc@byu.edu). Have the TA in the section you are doing the makeup in turn in your lab report and it should be properly recorded and returned to you in your normal section after grading.

You may attend labs in other sections only with permission both your TA and the hosting TA and only for **valid,** infrequent reasons, such as work emergencies, illness, being out of town for a performance or interview, family emergencies, etc. **It is never acceptable to go to another section so that you can study, do homework, or take a test (even for physics).** Plan ahead. **If you attend another section without prior arrangements your participation score on that lab will be reduced by 2 points.** This is a serious penalty – see the section on how your grade is calculated.

We will have makeup labs twice during the semester (see the schedule for when those will occur). We will have sign-ups for these makeup labs a couple of lab sessions in advance so that we can have the appropriate equipment ready. These make up periods are really intended for emergency use only. You are **not** allowed to attend a makeup for a lab you have already completed. **You will only be allowed to make up one lab in each session without explicit permission from the instructor (not your TA).** You are also only allowed to make up the labs specified for that session without explicit permission from the instructor (not the TA).
Grading of Labs

Your TA will visit you and initial your overview paragraph (near the bottom of what you have written) at the beginning of the lab period. Your TA will also grade your participation during the lab period. Separate graders will grade other parts after the period. You will turn in your lab write-up at the end of your lab period and it will be graded between lab periods. Your grade on the lab will consist of the following 4 parts:

A. Preparation: 3 Points.
Understanding of physics before coming to lab, outline section done well, careful reading of manual before asking questions about procedure.

B. Participation: 3 Points.
Punctuality, following grouping instructions, participation in discussion and handling of the equipment, engagement with the experiment, cleaning up work are before leaving.

C. Measurements and analysis: 3 Points.
Careful data taking and recording, correct analysis and calculations, specification of units on all values, adequate and correct labelling of all graphs and tables (including units).

D. Results/Discussion/Conclusions: 3 Points.
Insightful comments on results, discussion of how well the measurements show physical principles, discussion of possible sources of error in your results and the relationship between what was done in the lab and other physical systems outside of the lab, comments on what you learned in the lab.

A score of 3 on a section means that you have done everything expected of that lab, with maybe some minor problems. A score of 2 means that the section is deficient in some meaningful way. A score of 1 means that the section is seriously incomplete or just wrong. A score of 0 means that the section was not seriously attempted.

Your scores will be available on the internet. Go to and click on “Scores and Current Grade” in the lower right corner of the course website homepage. To access your scores, you will need your BYU user ID and password. Please check your scores frequently and please carefully read the Confirmation and Documentation section on the next page.

If you were registered for the class shortly before the semester started, your CID should have been emailed to you at the email address you furnished the university. If you changed sections since that time, it doesn’t affect your CID. If you added later, you can ask your TA for your CID.

You should receive your lab report back at the beginning of the next class period. If you receive a 2 or lower on any part of the lab, the reason should be indicated on the report.

Papers during the semester
The highest grade you can earn by just doing the labs is an A-. In order to earn an A in the class you will need to turn in two papers during the course of the semester. Each paper should be 2 pages in length, double-spaced with no larger than a 12-point font and one-inch margins. The first will be due the week of lab 6. The last paper will be due at the time of the last lab period. The topic of each paper should be an application of the principles of physics demonstrated in one of the labs taken during the preceding weeks and including the week when it is due. It is not to be just a rehash of the ideas in one of the labs, but rather an application of those ideas to something outside of the physics lab. The first paper would be on one of the topics in labs 1-6; the second would be on one of the labs 7-11. If you don’t earn an A- in the class (due to missed labs or poor labs) then the two papers will boost your grade by 1 grade level. If you turn in only one paper, then it will boost your grade by ½ a grade level (i.e., if you have a low B+ it will stay B+ but if you have a high B+ it will
be raised to an A-. The papers will be expected to be well written, properly spelled, grammatical and coherent in their ideas. Your TA will grade them as either acceptable or unacceptable. If a paper is unacceptable (because of the writing or wrong physics) you can rework it and turn it in again and Dr. Christensen will grade it.

Your Final Grade
If you turn in all the labs and get 3’s on all sections you will get an A-. If you turn in both papers you will get an A. If you get 4 or more 2s on your labs, then your grade will be lowered by the appropriate amount. Since a score of 2 represents a meaningful deficiency, four or more 2s represents a meaningful deficiency in 36% or more of the labs that you did or multiple deficiencies in several labs. Your final grade is not based on any of the commonly used percentage scales.

Confirmation and Documentation
Your grade will be based on fifty separate scores (four for each lab, plus one for each writing assignment). Since each of those scores will be determined by a TA, transferred from your lab report to a score report sheet, then entered from that report sheet into a computer, there will be a total of 150 numerical assessments or transfers leading to your grade. Multiple that 150 by the number of students in all sections of the course and you will see that there are tens of thousands of assessments or transfers of numerical scores each semester. For that reason, given the fact that these actions are performed by humans, there will inevitably be some errors made by the time all scores are in the computer which will calculate grades. For this reason you are responsible to (1) monitor your scores to make sure they are correctly recorded in the computer and (2) keep your lab reports as supporting documentation for an error in your recorded scores. Your instructor can correct your scores, but will do so only if there exists physical evidence of such an error. In some cases it will be possible for him to see where an error has occurred, but in other cases your lab report will be the only physical evidence of such an error.

Course website
You will find a course website at http://www.physics.byu.edu/faculty/christensen/Physics 107/W13/Ph 107.htm. You will find there some repetition of the materials in the packet, but also contact information for your TAs, a web-based access to your currently recorded scores (which you should check periodically to make sure your work has been accurately recorded) and miscellaneous other materials..

Brigham Young University
We are grateful for the opportunity to work with you in the unique environment of BYU. We hope you are also grateful. Please abide by the honor code and the dress and grooming standards. Show integrity in your work and kindness to others.

Honor Code Standards
In keeping with the principles of the BYU Honor Code, students are expected to be honest in all their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. This also means that you are not to ‘dry-lab’ the results, you must actually come to lab and do the work. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university.

Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university’s expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have any questions about those standards.
Preventing Sexual Discrimination or Harassment

Sexual discrimination or harassment (including student-to-student harassment) is prohibited both by the law and by Brigham Young University policy. If you feel you are being subjected to sexual discrimination or harassment, please bring your concerns to the professor. Alternatively, you may lodge a complaint with the Equal Employment Office (D-240C ASB, 422-5895) or with the Honor Code Office (4440 WSC, 422-2847).

Students with Disabilities

If you have a disability that may affect your performance in this course, you should get in touch with the office of Services for Students with Disabilities (1520 WSC, 422-2767). This office can evaluate your disability and assist your professor in arranging for reasonable accommodations.