

## 1 Syllabus for Physics 206 - Laboratory

1.1	Term	Spring 2016	
1.2	Meeting times		
1.2.1	Section 1	Tuesday	1:10 to 3:00
1.2.2	Section 5	Thursday	1:10 to 3:00
1.3	Instructor	Brad Halfpap	
1.4	Office	CHCB 232	
1.5	Phone	243-6237	
1.6	email	bradford.halfpap@umontana.edu	
1.7	Office hours		
	1.1.1	Tuesday	10:00 to 11:30
	1.1.2	Wednesday	10:00 to 11:30
	1.1.3	Thursday	10:00 to 11:30
1.8	Textbook	None	

## 2 Description of the course

2.1 You should become familiar with the Moodle site for this class as you will find the laboratory handouts there for each week. You are expected to bring a copy of the handout for each week and your lab notebook with you to each lab meeting. There are additional materials posted there as well. Quizzes will be given through the Moodle interface.

2.2 I have four learning goals for the laboratory course.

2.2.1 *I want you to learn to make careful and correct measurements in the laboratory.* This means that you are to measure the indicated quantities with the appropriate instruments - *using them well*. If you do this you will get very nearly the measurement I did when I used the same equipment to investigate the same questions. I will assess this with one or more questions on lab quizzes asking for your measurement result. You will give your measurement with an associated uncertainty. Your score will reflect how well you used your measurement tools and whether you present your results appropriately.

2.2.2 *I want you to learn to perform appropriate analyses of your data.* I will explain how you might do this for each week's laboratory exercise. As examples, you might do a statistical analysis or perhaps a graphical analysis. I will assess this by asking for intermediate or final results on your lab quiz. Your score will reflect how well you did your computations.

2.2.3 *I want you to be able to understand and use simplified error analysis techniques.* You should be adept at this from your work in

Physics 206. I will ask you for your uncertainties in intermediate or final computations on your lab quizzes. Correct use of our analysis scheme will get you full credit. We will make extensive use of spreadsheets. You need to have a reasonable facility with EXCEL.

2.2.4 *I will want you to understand the physical implications of some of the major concepts featured in the laboratory exercises. We will discuss some of these during the introduction to the labs but I will expect you to be able to think and apply your knowledge on the spot. Most weeks there will be a question to assess this on your lab quiz.*

2.2.5 *Every person needs to understand everything that was done during the data collection and data analysis parts of the laboratory. I will ask questions about these things on the quizzes and you will be on your own at that point. Observe and ask questions of your lab group members. Write notes to yourself about what was done and why.*

### 3 Course Grades

3.1 There are 11 laboratory exercises; for each there will be a pre-lab quiz and a post-lab quiz ( for all 11 ). There will be no opportunities for make up labs. All of the quizzes are taken on our Moodle site. *All of the quizzes are individual efforts. You should use your laboratory notebook and the laboratory handouts but you may not consult with anyone during your quiz. In addition, you are not to tell anyone who has not yet taken the quiz anything about it.*

#### 3.2 Pre-Lab Quizzes

3.2.1 You will have until **11:00pm on Monday** to have completed the Pre-Lab Quiz. There will be 11 such quizzes and your grade will, in part, be based upon your best 10 scores. There will be no late or make-up quizzes. Each Pre-Lab Quiz will require you to do computations similar to the questions asked in the laboratory handout. *Do not leave this until the last moment. The Moodle clock may differ from yours by several minutes and it is not forgiving.*

3.2.2 Work through the handout before starting the quiz.

3.2.3 Keep at least 4 digits during your computations. Give answers on pre-lab quizzes to 3 significant digits unless you are directed otherwise.

3.2.4 Read the questions carefully and answer the question that was asked. People make up their own questions all the time. They never get credit for doing that.

- 3.2.5 All questions will either be multiple choice or require a numerical value as an answer.
- 3.2.6 Units will be a required part of most answers. 100% of the time you will be required to use standard SI units ( m, kg, s, J, N, etc. ). If you use non-standard units ( g, cm, mm, km, etc. ) you will lose that part of the credit. Use the standard units throughout the entire semester.
- 3.2.7 You will have 60 minutes to complete the quiz but it is designed to be completed in 10 minutes by a well prepared student.

### 3.3 Post-Lab Quizzes

- 3.3.1 You will have until **11:00pm on Friday the week after your lab meets** to have completed the Post-Lab Quiz. There will be 11 such quizzes and your grade will, in part, be based upon your best 10 scores. There will be no late or make-up quizzes. *Do not leave this until the last moment. The Moodle clock may differ from yours by several minutes and it is not forgiving.*
- 3.3.2 Each quiz will follow the same format. There will be one ( possibly multi-part ) question to assess each of the four learning goals listed above.
- 3.3.3 For measurement questions credit will be given based upon how well you made your measurement. Pay attention to the units requested; being off by a factor of 10 or 1000 will surely result in zero points for that question.
- 3.3.4 For questions regarding uncertainties it will be possible for you to give values that are too large or too small. Pay careful attention to what you are actually doing during the laboratory period and make notes in your book.
- 3.3.5 There will be a range of acceptable values for computed results. The range is not without limit though. Typically you will need to be within about 20% to receive full marks however this can vary significantly for particular laboratories.
- 3.3.6 If you have done your analysis in a thoughtful fashion you should be well prepared to answer the application problem. It is usually inspired by the calculations that you were to have done.

3.3.7 Each quiz will be designed to be finished in not more than 15 minutes by a well prepared student. You will have 30 minutes from the time you start to complete the quiz.

3.4 The Pre-Lab Quizzes will count for 15% of the semester grade. The Post-Lab Quizzes will constitute the remaining 85%. The distribution of grades across all sections will, by departmental policy, be about 25% A, 25% B, 25% C, and 25% D & F. All students who complete the first two weeks will be counted in this total and thus some of the D and F grades will be associated with students who have withdrawn from the course.

4 For a detailed schedule of the course, see our Moodle site.