

## 1 Syllabus for Physics 208 - Laboratory

1.1	Term	Spring 2020
1.2	Meeting times	
	2.1.1	Monday 3:00pm to 5:00pm
	2.1.2	Tuesday 1:00pm to 3:00pm and 3:00pm to 5:00pm
1.3	Instructor	Brad Halfpap
1.4	Office	CHCB 232
1.5	email	bradford.halfpap@umontana.edu
1.6	Office hours	Monday 8:00am to 3:00pm with time off for lunch
1.7	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.

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 post lab quiz given during the first 15 minutes of the next lab session. The last lab will be treated differently. The best 9 of these quizzes will constitute your total lab score.

3.1.1 Each quiz will follow the same format. There will, as a rule, be at least one ( possibly multi-part ) question to assess each of the four learning goals listed above.

3.1.2 For measurement questions credit will be given based upon how well you made your measurement. Pay attention to the units requested.

3.1.3 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.

3.1.4 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.

3.1.5 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.

3.1.6 Each quiz will be designed to be finished in not more than 5 minutes by a well prepared student. You should mostly be copying results from your laboratory analysis. Do not plan to do ANY of the calculations called for in your handout or requested by me in my laboratory introduction during the quiz time. You will have 15 minutes from the time class begins to complete the quiz.

3.1.7 Everyone will be taking their quiz on their own! That means you must be familiar with everything that was done in the lab and afterward in completing the analysis.

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