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PHSX 216N.03: Physics Laboratory I with Calculus

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Course Information

- Instructor Name: Dr. Alex Bulmahn
- Office: CHCB 226
- Email: alexander.bulmahn@umontana.edu
- Lab: Wednesday 3:00-4:50pm in CHCB 229
- Office Hours: T 11-1, W 1-3, R 11-12. Please feel free to email me and make an appointment for other times.
- Website: [Moodle](https://moodle.umonline.umt.edu) umonline.umt.edu

Overview

The goal of this class is to give you a sound introduction to classical experimental physics. This will include studying some basic concepts in physics, development of problem solving skills, learning of laboratory techniques and some basic programming skills for data analysis. It is essential that you keep up from the start as the concepts in this course build on each other. Co-requisite to this course is PHSX 215.

Learning Objectives

The goals of this course are:

- To learn how to properly take measurements and record data.
- To learn how to interpret results both statistically and graphically.
- To experimentally confirm theories presented in lecture.

Laboratory

There will be 11 two-hour labs during the semester. Ten of those labs will count towards your final grade. You will be required to attend the labs, take measurements, and then write up a report and take a quiz for each lab. Each student must hand in their own lab report written in their own words. If you miss a lab, you may not attempt the quiz.

IMPORTANT: The two full write-ups will be worth 25% of your grade. The remaining 9 quiz/short write-ups will be worth 65% and prelabs will be worth 10%. We will drop the lowest score of the 9 quiz/short write-ups and the lowest prelab score. **NEITHER of the scores from the 2 full write-ups will be dropped.** If you miss one of them, you will need to work with me to select another lab for which to do a full write-up. PLEASE avoid this if at all possible!

In preparation for the course, you should go to the course Moodle page to download the document, "Treatment of Data", which explains how to handle error analysis, graphing, and other key issues that come up while writing labs. Each week, a few days before your lab, you should read the current lab. Students are expected to have read the instructions prior to arriving at the lab, and will be asked to take a brief pre-lab quiz on Moodle.

There will be NO MAKE-UP LABS. If you will miss your lab, contact your instructor *ahead of time* about attending another section that week. Labs are held Mon, Tues, Wed 3:00-4:50pm.

Lab Report and Quiz Due Dates

- Pre Lab Quizzes: On Moodle, open on Thursday at 8am and close at 11:59pm the day before your lab section. 60 minutes allowed to take quiz.
- Lab Quizzes: Taken at beginning of lab. Generally given 15 minutes to take quiz.
- Lab Reports: Due at beginning of the following lab meeting.
- Late Penalties for Lab Reports: Late lab reports will be penalized 10% per day late, excluding holidays and weekends. Labs will not be accepted more than one week after their due date.

Course Guidelines and Policies

Student Conduct Code

The Student Conduct Code at the University of Montana embodies and promotes honesty, integrity, accountability, rights, and responsibilities associated with constructive citizenship in our academic community. This Code describes expected standards of behavior for all students, including academic conduct and general conduct, and it outlines students' rights, responsibilities, and the campus processes for adjudicating alleged violations. [Full student conduct code.](http://www.umt.edu/vpsa/policies/student_conduct.php)

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Course Withdrawal

Students may use Cyberbear to drop courses through the first 15 instructional days of the semester. Beginning the 16th instructional day of the semester through the 45th instructional day, students use paper forms to drop, add and make changes of section, grading option or credit. PHSX 216 may not be taken as credit/no-credit.

Disability Modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and [Disability Services for Students](https://www.umt.edu/dss/default.php). <https://www.umt.edu/dss/default.php> If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Grading Policy

Generally, final letter grades fall within these ranges:

A or A- = 90-100%. B+, B, or B- = 80-89%. C+, C or C- = 70-79%. D+, D or D- = 60-69%. F = 59% or less.

Your grade will be based on the following:

Pre-Lab quizzes: 10%

Lab quizzes and short write-ups: 65%

Full Lab Reports (2): 25%

Lab Schedule

Date	Lab and Assessment
Week 1: Aug 27 – Aug 31	Introduction to Error Analysis
Week 2: Sept 3 – 7	NO LAB, Labor Day
Week 3: Sept 10 – 14	Quiz: Introduction to Error Analysis Pre-lab Quiz and Experiment: Introduction to Python and Measuring g
Week 4: Sept 17 – 21	Quiz: Introduction to Python and Measuring g Pre-lab Quiz and Experiment: Projectile Motion
Week 5: Sept 24 – 28	Quiz: Projectile Motion Pre-lab Quiz and Experiment: Force Tables
Week 6: Oct 1 – Oct 5	Quiz: Force Tables Pre-lab Quiz and Experiment: Hooke's Law
Week 7: Oct 8 – 12	Write-up(full) Due: Hooke's Law Pre-lab Quiz and Experiment: Circular Motion
Week 8: Oct 15 – 19	Quiz: Circular Motion Pre-lab Quiz and Experiment: Ballistic Pendulum
Week 9: Oct 22 – 26	Quiz: Ballistic Pendulum Pre-lab Quiz and Experiment: Collisions
Week 10: Oct 29 – Nov 2	Quiz: Collisions Pre-lab Quiz and Experiment: Moment of Inertia
Week 11: Nov 5 – 9	NO LAB – Election Day
Week 12: Nov 12 – 16	Write-up(full) Due: Moment of Inertia NO LAB – Veteran's Day
Week 13: Nov 19 – 23	NO LAB - Thanksgiving
Week 14: Nov 26 – 30	Pre-lab Quiz and Experiment: Archimedes' Principle
Week 15: Dec 3 – 7	Quiz: Archimedes' Principle Pre-lab Quiz and Experiment: Simple Pendulum Quiz: Simple Pendulum
Week 16: Dec 10 – 14	NO LAB, Finals week