Classical Physics I Laboratory (Phy133)

Spring 2025

Instructor:	Dr. MacKenzie Lenz	**Lab:**	F 9:00-11:20
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Statement on a Syllabus and Approach to Teaching: A syllabus is the "legal contract" between the instructor and the student. As such, the language has to be precise and can sometimes seem harsh. And in any course, it's necessary to set rules and boundaries. Despite how it may sometimes sound, your instructors (that's me) want first and foremost for you to succeed. I will work with you to address special circumstances or personal issues that arise during the term. I encourage you to contact me at any time (email is usually best) with concerns you have about the course, your standing in it, or your ability to complete your work. I also reserve the right to alter this syllabus but will alert you to any alterations.

Statement on Remote Teaching: We plan to teach this semester completely in person. If we must move to remote teaching all elements of the syllabus still apply but please feel free to ask clarifying questions or to bring to my attention when elements may not work with a remote environment.

Office Hours: Tuesday in my office A520, or on Zoom, from 2-4pm or by appointment. I have an open door policy so if my office door is open please come on in to ask questions. Feel free to email me when you need help as well and I am happy to hop on Zoom if I am free. Office hours may change depending on student availability. If they change an announcement will be made and the syllabus will be updated.

What is Physics?: Physics is the study of nature. It is a living discipline, not a collection of facts. It is the science of daily existence. Everyone has direct experience with the physics concepts on a daily basis. The formal study of physics should guide and clarify your understanding to build a consistent basis of fundamentals that allows you to build models for describing the physical behavior of unfamiliar or complex systems. Physics is about reasoning, making connections, and understanding what will happen in a situation, and why it happens.

In order to do physics in a genuine sense, it is necessary to be able to apply the skills used within the discipline to new situations. When dealing with new situations, mathematical models are used to describe them. Applying these models often requires simplifications or assumptions about the physical situation. It is necessary to become proficient with the use of models, their applicability, when they are not appropriate and why, and to be able to analyze situations multiple ways. One goal is to develop a set of skills and tools that one can use to analyze any basic system, and to understand what the next step would need to be to address a more complex aspect of that system.

It is important to know terminology, and useful to know facts such as historic progressions, but these things can be obtained from a multitude of sources. There are many textbooks and online resources for gathering facts. More importantly, in today's world there is more information available than any one has time to parse, so the whole nature of coursework must change with the times.

Course Requirements and Materials:
Texts: There is no text required for this Lab course, all assignments and readings will be posted online. If you would like recommendations for supplemental materials to read let me know and I can provide a list.
Calculator: A scientific calculator with graphing capabilities will be useful but not required. Graphing calculators, those with a solver feature and/or graphing window, and laptop or palmtop computers may not be used for any closed notes assessment. For a list of acceptable calculators please see the following website: https://ncees.org/exams/calculator/. If you want to know whether or not your calculator is acceptable or not for closed note assessments, then consult the instructor well before the first assessment.

Technology

- Google Apps: We will mainly be using google classroom and apps like google sites or slides for this course. You should be able to access these apps with your @stonybrook.edu email address.
- Word Processing Software: Word, Pages, Google Docs, and LaTeX are a few options for this software types that will be useful for this course.
- Spreadsheet Program: Excel is preferred and available to you in the lab classroom and from the library. Google sheets and Numbers are also okay but not every graph we will make is accessible in these programs.
- Other programs: due to the possible remote nature of the labs it may be required of you to download software to acquire data. If this is needed you will be given plenty of advanced notice.

Course Description: Two hours and twenty minutes of laboratory class per week, related to lecture course PHY 131.
We will be covering topics like error analysis, projectile motion, momentum, collisions, conservation laws, angular momentum, simple harmonic oscillators, standing waves, and the ideal gas law.

Course Fee: This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Course Objectives: In this class you will apply the classical laws of physics to real world problems. Students will learn how to relate experimental results to underlying mathematical concepts learned in the classroom. This will help you reinforce and better understand the concepts learned in lecture and recitation. You will be introduced to the concepts of measurement and error, learn to use basic lab equipment, learn about different measurement techniques, and how to analyze your data.
This course should improve your ability to reason with data and critical thinking. By the end of the course you should be adept at creating, performing, and analyzing the results of an experiment. Specifically, you should be able to solve problems by applying principles of physics using reasoning and scientific methods, including:

- analyzing actual situations to determine the germane principles of physics;
- making both conceptual and quantitative predictions of behavior based on principles of physics;
- testing those predictions using evidence-based results;
- and communicate your findings in a succinct and accurate way.

Learning Outcomes: By the end of this course, you will be expected to:

1. Constructing Knowledge - Students will demonstrate the ability to reach a conclusion regarding physical situations based on the successful collection, analysis, and interpretation of data.
2. Analyzing and Visualizing Data - Students will use accepted methods for analysis and display of data, including using statistical methods to critically interpret the validity and limitations of these data and their quantitative uncertainties.
3. Developing Technical and Practical Laboratory Skills - Students will demonstrate proficiency using and troubleshooting experimental equipment in order to effectively collect and analyze data. They will also learn to keep a good record of their methods and findings in a laboratory notebook.
4. Communicating Physics - Students will use appropriately constructed and reasoned arguments, supported by experimental evidence, to reach defensible conclusions that can be readily understood and appreciated by others.

What to Expect from Lab: The lab is the appropriate place for you to apply the tools and skills to explore more complex situations. The labs will get increasingly more open-ended, so eventually you will be able to do authentic physics modeling of real situations. Required lab reports may take different shapes, peer review may be involved in your reporting process, and reports will be come more in-depth as you learn to communicate your findings.

Participation: Attendance and participation in lab activities is mandatory. If you are going to miss a lab you should notify me immediately as there are very few, if any, make up opportunities. I am happy to work with you in case of emergency but missing more than one session without making them up will cause you to fail the course. SUNY's attendance policy is that if you miss over 20% of class, or more than 2 labs with no make-up, you **fail** the course.

Homework: Each lab will have a worksheet for you to demonstrate your understanding. These worksheets will be provided to you. Worksheets are to be completed during that lab session or shortly there after, submitted electronically within 4 days, one submission for the whole lab group, and should be graded quickly for completion not correctness.

Peer Review: Before submitting your formal lab report for grading, there will be an opportunity to substantially improve it through a peer review process, in which you will discuss your report with another student in the lab. For peer reviews, you will be expected to submit a rough draft of your peers report and the comments you make for them. This does not have to be a completed report, but it should be enough to show that reasonable effort was put into the draft. You will be graded on your participation in the peer review process, not on the rough draft.

Formal Reports: 3 formal lab reports will be due throughout the semester. These reports are to teach you and help improve your science communication skills. They will be typed, formal reports, that go through a peer review process. More instructions on what goes into a formal report will be on the Google Classroom site.

Lab Notebook: A lab notebook is not required for this class but highly encouraged. This could be a place where you keep, and organize, all the worksheets, formal reports, and any other notes taken during the class. Keep a lab notebook is a good practice and I encourage you to begin the practice now.

Cheating and Academic Dishonesty:
Cheating, including plagiarism and unauthorized use of AI/Grammarly, is strictly prohibited. Any violations will be reported to Academic Affairs for investigation. The first offense results in a zero for the affected work, and a second offense will lead to failing the course.

Grading Distribution: Your final grade will be calculated using the following weighted averages:

- Participation – Attendance and class activities (10%)
- Homework (20%)
- Peer Review (20%)
- Formal Lab Reports (50%)

Automatic Fail: You will fail the course if you miss more than 2 lab session and do not make one up.

Grade Scale: The following table will then be used to convert your course scores into letter grades:

Grade	A	A-	B+	B	B-	C+	C	D	F
% $\geq$	87	85	83	72	70	68	55	45	<45

Example: Student X earned an average of 90% on their attendance and participation in the labs; they earned an average of 77.5% on their homework; they earned an average of 80% on their peer reviews; and they earned an average of 70% on their reports. The final grade for student X is:

$$(90 * .10) + (77.5 * .20) + (80 * .20) + (70 * .5) = 75.5 = B$$

Late Policy: Written work will be submitted on Google Classroom by 11:59 pm on the date it is due. Late homework will be graded such that 20% of the credit will be deducted for every day the assignment is late. No credit will be given after 3 days late.

Verifying Grades: Grades are posted on Google Classroom. Assignment grade details will also be available on Google Classroom. It is your responsibility to ensure that the posted grades are correct. To do this you should contact the instructor who assigned the grade through email. Once a grade is posted, you will have three days to challenge it. After that, the grade will be considered final and changes will only be considered in extraordinary circumstances.

Statement of Expectations for Student Conduct: I recognize that science is inherently a social and collaborative effort, each scientist building on the work of others. Nevertheless, each student must ultimately be responsible for his or her own education. Therefore, students will be expected to abide by all university rules regarding student conduct and academic honesty and to abide by a number of Ground Rules:

1. I strongly encourage students to work with each other, more advanced students, the TA, and the professor, on assignments. However, each student is expected to turn in assignments that have been independently written up. In other words, the final synthesis must be entirely your own. This applies also to, and especially to, computer generated worksheets. If you work with someone on a computer project, do not get locked into writing the solution together as you will end up turning in the same assignment.

2. Solutions from previous years are very strictly off limits. You are on your honor not to use them, and not to share your solutions with other students. Allow faculty to use their time interacting with you, rather than continually thinking up new assignments. Besides, if you don't do the work yourself, it will show up very clearly on assessments later. Likewise, the solutions are for your use only. You may make one copy and keep it in your personal files.

3. Sources must be appropriately documented. If you find a homework problem worked out somewhere (other than homework solutions from previous years), you may certainly use that resource, just make sure you reference it properly. If someone else helps you solve a problem, reference that too. In a research paper, the appropriate reference would be: Jane Doe, (private communication).

4. Plagiarism – representing someone else's work as your own – is unethical, but collaboration and exchange of ideas is healthy. You can avoid having collaborative efforts take on the look of plagiarism by acknowledging sources and by writing up your work independently.

5. If you find that you have worked on a problem for 1/2 hour without making any forward progress, it would be a good idea to stop and seek help.

Student Accessibility Support Center Statement: If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Academic Integrity Statement: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.