Classical Physics I (Phy131)

Spring 2025

Instructor:	Dr. MacKenzie Lenz	**Lecture:**	TR 9:00-10:20 am
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Office:	A520	**Rec. Location**	B105

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:
Prerequisites: MAT 123 or level 5 on the mathematics placement examination.
Corequisites: MAT 125 or MAT 131 or MAT 141 or AMS 151.

Texts: The textbook for this course is not required. If you do want to purchase a book I have included here an international edition however most general physics with calculus books are similar so use whichever is easiest for you to acquire. I will give suggested readings that will include both the Giancoli textbook, which you can find in the library, and the open-source online texts listed below.

- International Edition, Physics for Scientists Engineers, 4th Edition, Giancoli, ISBN 9781292020761
- https://openstax.org/details/books/college-physics
- hyperphysics.phy-astr.gsu.edu/hbase/index.html
- Other textbooks: Knight, Young and Freedman, or Haliday and Walker

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 jamboards for this course. You should be able to access these apps with your @stonybrook.edu email address.
- Socrative: We will use the website socrative.com for all clicker questions in class.
- Zoom: If we move to an online environment we will be using Zoom, otherwise it will not be needed for this course.

Course Description: First part of a two-semester physics sequence for physical-sciences or engineering majors who have a strong mathematics background and are ready for a fast learning pace. It covers mechanics, wave motion, kinetic theory, and thermodynamics. Calculus is used concurrently with its development in MAT 131. The laboratory component, PHY 133 (Lab I), can be taken concurrently. The course is divided into two class types, lectures and recitations. In lectures, we will be discussing new material mainly from the book. Lectures will have interactive components, so be ready to discuss ideas with classmates and to be active. Recitations will be sessions where we solve problems together as a class.

Course Objectives: The goal of this course is to improve your ability to apply scientific methods and to solve problems through the logical application of accepted principles of science. This includes using equations as shorthand for our understanding. It will require you to examine the situations with which you are presented to determine the relevant physical principles, and to use them to predict the subsequent behavior of the system.
This course should improve your ability to reason through critical thinking. By the end of the course you should be adept at using logic and scientific analysis. Specifically, you should be able to solve problems by applying principles of physics using reasoning and scientific methods, including:

- analyzing both hypothetical and actual situations to determine the germane principles of physics;
- making both conceptual and quantitative predictions of behavior based on principles of physics;
- and testing those predictions using evidence-based results.

This will include interpreting statements and communicating results by understanding and properly using scientific definitions in well-written, reasoned statements.

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

- understand how to represent and analyze motion for solids, oscillations, and waves;
- understand thermodynamic systems;
- determine the relevant fundamental physics principles at play, use them to analyze the behavior of physical situations, and extend these general situations to specific applications;
- make observations of physical behavior and find explanations that are consistent with the observations, apply these explanations and the established laws to make predictions about outcomes of experiments, and test the explanations and laws through experimentation;
- represent information in multiple ways (diagrams, graphs, words, equations. etc.), and move from one representation to another, use these representations to set up problem solutions, predict the behaviors of systems, and to check the solutions to problems;
- and use critical thinking skills within physics problem solving as described below.

In many ways, physics is the discipline of modeling and problem solving. At the heart of this is critical thinking. In this course, you will be taught to look at new situations and make assumptions about the situations that allow you to make appropriate simplifications to apply physical models. Critical thinking in this class is being able to:

- analyze an open-ended, new physical situation;
- consider what assumptions and simplifications can be made to this situation;
- break down the situation into manageable pieces;
- apply the concepts learned to solve these pieces and put them together for a solution;
- and evaluate if the solution makes sense.

Your learning outcomes and critical thinking will be developed through in-class demonstrations, voting questions, peer-to-peer discussions, full-class discussions, group work and lab work. My goal is to avoid traditional lecture where I talk and you listen. Be prepared to actively participate in class.

What to Expect from Lecture: Lecture meets for one and a half hours, two times per week. The purpose of lecture will be developing conceptual understanding, working on representing phenomena, practicing problem solving, and building understanding though observations and explanations of phenomena. Lecture is interactive. There will be times in lecture that you are strongly encouraged to talk with other students near you. Questions, comments, and interruptions are welcome, but please raise your hand. Pre-printed notes won't be available because the notes will be unique to what happened each day. However, I will attempt to post lecture notes after lectures for students to access.

What to Expect from Recitation: Recitation consists of weekly group problem solving sessions. You will work in small groups of 3-4 students solving physics problems. Attendance and participation with your group in the recitation activities is required. Recitation is primarily an opportunity to work on questions with your group. To gain the full benefit of recitation you should take an active role during the sessions.

If you are Struggling

It's imperative in this course that you don't fall behind, as each topic builds n those that came before. If you're struggling to keep up, I strongly encourage you to take advantage of the extra help that is available. Work with your peers, talk to your instructor or TA, and come to office hours.

The most important thing is that you ask for help sooner rather than later.

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

- Participation – Get-ready/In-class/Activities (10%)
- Homework Activities (15%)
- Quizzes (30%)
- Final (30%)
- Project (15%)

The lowest quiz score can be replaced by the final exam score if the final score is higher.

Final Grades: Final grades are fixed. There is no curve in this course. You are not competing against each other for a grade. Some classes do better than others. Some do worse.

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
% ≥	87	85	83	72	70	68	55	45	<45

Example: Student X earned 90% average of their participation points; 85% average for the homework points; on the three quizzes they scored 67.5% on the first quiz, 75% on the second quiz, 70% on the third quiz; 77.5% on the final which also replaces the 67.5% on the first quiz; and finally they scored a 87.5% on the course project. The final grade for student X is:

$$(90 * .1) + (85 * .15) + [(77.5 + 75 + 70)/3 * .3] + (77.5 * .3) + (87.5 * .15) = 80 = B$$

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.

Assessments: There will be three quizzes and one final exam given within the term. There may be different options for which quiz you would like to take such as a real-time or verbal quiz. More information about each of these options will be posted on the course site. If options are given, you will confirm which version of the quiz you would like to take about a week before the quiz date, if you do not choose it will be assumed that you will take the in-class timed version.
The instructor may opt to assign assessment reflections that may be worth additional points toward your assessment score. If you believe that an error was made in the grading of an assessment question, you should request a regrade as outlined below.
Any official assessment conflict must be discussed and arrangements made with the instructor before the assessment. Unexcused absence will result in a zero for the assessment, including the final exam. If you believe that an error was made in the grading of an assessment question, then bring your complete assessment to the instructor within one week after the assessment was returned. Never make any alterations or additions to the assessment itself. This includes the cover page and the back of each page. Explain to the instructor the error you believe occurred and they will discuss with you any corrections that may need to be made.

Project: Projects are group assignments where you will demonstrate and synthesize what you have learned over many weeks. Projects may take many different potential forms, including written, visual, or video. More information will be posted on the course website. If you would like to suggest a project type that is not outlined you are welcome to come up with an idea and present it to the instructor, they will then work with you to refine the idea if it is to be your project for the term.

Prep assignments: Before coming to each lecture you should complete the appropriate Get-ready Activity. You should check for an assignment for every lecture. Completion of these assignments is part of the Participation grade for the course. Late completion will lose points according to the late policy.

In-class questions: Lecture will include questions you answer electronically. Active participation, primarily through group activities, is part of the Participation grade for the course.

Homework: Homework assignments are given each week there is not an assessment. Solutions should be written out in a google doc or converted to pdf to be submitted electronically through Google Classroom. They are hand-graded based on completeness and effort, be sure to answer each question fully to get full points. Each problem should start on a new page. Submissions must be legible; it's recommended that you scan hand-written work rather than submit a photo. (There are many free apps that turn your phone into a scanner, if you need help with this just ask.)
Collaboration on homework is encourage, but all work that is submitted should be your own. If you work with others, you should acknowledge that. *Under no circumstances is it proper to submit solutions copied from a website or another student, this is plagiarism and considered cheating.*

Attendance: Attendance and participation are essential and expected. Your grade includes a portion based on your active participation during classes. If you are more than 10 minutes late to class you can not receive attendance for the day. SUNY's attendance policy is that if you miss over 20% of class, over 6 lectures or 3 recitations, you **fail** the course.

Communication: Google Classroom is the source of class information (including this syllabus), videos, resources, assignments, and grades. I may also send information via email, so be sure to check your official Stonybrook email account regularly. There will be occasional announcements, such as last-minute changes, on google classroom. Check grades regularly; see the policy on verifying grades. There will be a single, integrated Google Classroom site for all aspects of the course.

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.

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.