PHY300, Waves and Optics, Spring, 2026 Syllabus

The physics of oscillations and waves, from mechanical waves to light waves to electron waves. Topics include resonance and normal modes of coupled oscillators, the wave equation and wave propagation, interference and diffraction, polarization, imaging and coherence. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Professor: Laszlo Mihaly , Physics Building B145 (on the bridge to the Math building), Email: Laszlo.mihaly@stonybrook.edu. Office Hours Monday 2:30-3:30pm

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Textbooks: 1. Vibrations and Waves by Anthony French, 2. Modern Optics by Grant R. Fowles

Lectures/Labs: MW 11:00am-12:20 pm, F 11:00am-12:50 pm

WEB site: Brightspace

Grading: HW 10%, Midterm Exams 30%, Worksheets 5%, Lab quizzes 5%, Lab reports 15%, Final Exam 35%

Learning Objectives

1. Students will demonstrate mastery of physics concepts related to oscillations, waves, and optics, and will be able to think critically and apply appropriate concepts to qualitative problems.
2. Students will demonstrate the ability to apply mathematical reasoning, including partial differential equations and linear (matrix) algebra, to quantitative physics problems.
3. Students will demonstrate scientific communication skills through thoughtful discussion, collaborative problem solving, and interpretation of experimental results.

Course Format

Lectures and laboratory experiments are integrated into a Studio Physics format.

1. A worksheet will be posted on the course website and distributed in class before the Monday lecture.
2. Most worksheets include a laboratory experiment conducted on Friday. The experimental results, along with a short evaluation of the data, must be included in the submitted worksheet. This work may be completed during lab or shortly afterward.
3. To prepare for Friday labs, you must watch a short video and complete the associated quiz on Brightspace. The quiz deadline is Friday at 11:00 a.m. (before the lab session).
4. Worksheets are due approximately one week after distribution. The deadline is Monday at 11:59 p.m.

5. Two formal lab reports are required. Failure to complete them will result in a severe penalty to the final course grade. Each report is due 2 weeks after the lab, on Friday at 11:59 p.m.
6. Homework is due on Tuesday at 11:59 p.m., following the week in which the topics were covered in lecture.
7. Homework, worksheets, and lab reports must be submitted on Brightspace. Late submissions incur a 10% penalty per workday (Saturday, Sunday, and school breaks do not count). For example, if a worksheet is worth 10 points and is submitted on Tuesday instead of Monday, the maximum score is reduced to 9 points; on Wednesday, to 8 points. All required work must eventually be submitted, even if the maximum score is reduced to zero.

Worksheets

Most worksheet questions are completed during lecture. Occasionally, students may be asked to answer a few questions as a homework.

The final section of most worksheets concerns the Friday lab experiment. For the labs, students should form teams of no more than four members. Instructors may occasionally reassign students to balance group sizes or for other logistical reasons. Data must be collected and recorded during lab time. When possible, a preliminary evaluation of the data should also be performed during lab. The lab worksheet must be signed by a TA before the end of the lab session.

If a Friday lab is missed with a valid medical or other documented excuse, a make-up time may be arranged with the TAs. If a lab is missed without an excuse, the corresponding worksheet will receive zero points.

Required Elements of a Finished Worksheet

1. Short answers to all questions. Graphs must include labeled axes and units.
2. Brief notes on the lab procedure, as needed.
3. Clearly labeled data tables with units.
4. A graph of the data, with labeled axes and units.
5. A theoretical curve plotted on the same graph, when possible.
6. Numerical results with appropriate units.
7. A brief discussion of experimental uncertainty, if instructed.

Additional sheets of paper may be used as needed.

Worksheets must be submitted to Brightspace as PDF files with clear, descriptive filenames. You may scan handwritten pages using a smartphone or submit PDFs generated by text or data-processing software.

Lab Quizzes

A short video introduces the equipment used in each lab. After watching the video, complete the corresponding quiz on Brightspace. If questions arise during the lab, you may revisit the relevant portion of the video.

Lab Reports

Two formal lab reports are required. The associated worksheets must be completed as usual. In addition, each formal report must include:

- A complete description of the apparatus and experimental method
- A discussion of the relevant theory
- More extensive data analysis and error evaluation

A sample report is posted on the course website. Reports may not exceed eight pages, including the graphs of the experimental data and the theory. Data tables may be included in an appendix.

If a student misses a Friday lab associated with a formal report, the lab must be made up at a time arranged with the TAs, and the report must be submitted by an agreed-upon deadline. The latest possible deadline is the date of the last lecture of the semester. Failure to submit a required formal report will result in a six-point reduction in the final letter grade (e.g., from A to C or from B to D).

Exams

There will be two midterms and one final exam. Midterms will be held on Fridays during class time (see the course schedule). All exams are closed-book, with no external help permitted. A formula sheet will be posted on Brightspace and provided with each exam. Bring a calculator to the exams.

Missed midterm exams will be excused only with a doctor's note. There are no make-up midterms; instead, the score on the other midterm will be counted twice in the final grade calculation.

Working with Others

Collaboration is encouraged for worksheet questions and during lab experiments. If you are present and actively participate in data collection, sharing raw data in any form (e.g., Excel files) is allowed. For data evaluation (items 5–7 in the worksheet requirements), collaboration is permitted, but direct sharing or copying is not. You may share raw data tables and graphs of raw data, but fitted curves and evaluated results must be produced independently. Worksheet answers must not be copied.

Copying Homework Solutions from the Internet

Solutions to textbook problems can likely be found online. If you copy them, graders may recognize this but will not penalize you. However, doing so is strongly discouraged, as it will leave you unprepared for exams. Remember, homework counts for only 10% of the final grade, whereas the exams together account for 65%.

Artificial Intelligence (AI)

The use of AI tools is encouraged, with an important caveat.

A test conducted on 1/24/2026 using ChatGPT showed that AI can generate polished and often correct homework solutions. As with online solutions, you should use AI only as a last resort, after making a serious attempt to solve problems on your own.

AI-generated solutions frequently use symbols and notation that differ from those used in this course, making copying easy to detect. During the semester, we will monitor AI use. If excessive reliance is observed, students will be warned, and continued copying will result in penalties.

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 are 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. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website.

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. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Accessibility. Stony Brook University is committed to ensuring a supportive, inclusive, and equitable learning environment for all members of our community, which includes upholding the principles of Title II of the Americans with Disabilities Act (ADA). As a student in this course, it is important to recognize your role in ensuring that all classmates, including those who use assistive technologies, can fully engage with and comprehend the course content. Therefore, any digital materials you create and share, such as assignments, presentations, or shared documents, must be designed to be digitally accessible using the most up to date version of the WCAG 2.1 Level AA guidelines. Accessible practices include, but are not limited to, providing alternative text for images, using clear heading structures, and ensuring captions for any video or audio you incorporate. Guidance and assistance in making your digital content accessible can be found on the Accessibility Resources for Students page. For additional support, please visit Deque University.

Religious Holidays: If the schedule of homework, exams or other assignments conflicts with your religion's Holidays, please let me know in an email by the end of the first week of instructions and I will do my best to accommodate your needs. Please note that I cannot make changes to the course schedule after the first week of classes. No consideration will be made if someone approaches me in this matter at a time close to the due date or the exam date.

Week of	Topic	Reading	Worksheet	Friday Lab	Homework/Lab Reports
26-Jan	Simple Harmonic Oscillator	French Ch 1, 2	#1	Simple Harmonic Oscillator	#1 French 1-1,1-2,1-5,1-6, 2-1,2-2,2-3,2-4
2-Feb	Damping, Driving, Energy	French Ch 3,4	#2	Damped Oscillator	#2 French 3-1,3-2,3-3, 3-13,4-3,4-5,4-10, 4-13
9-Feb	Two Coupled Oscillators	French Ch 5	#3	Two Coupled Oscillators	#3 French 4-16, 5-2, 5-4, 5-9, 5-10
16-Feb	N Coupled Oscillators	French Ch 5	#4	LC Circuits	Lab report #1 Coupled Oscillators
23-Feb	Strings, Fourier Series	French Ch 6	#5	String Demo (no lab)	Midterm 1
2-Mar	Review				#4 French 6-1,6-2,6-6, 6-11, 6-12,6-14
9-Mar	Travelling Waves	French Ch 7	#6	Vibrating Rod, Sound waves	#5 French 7-1, 7-2,7-3,7-4, 7-5, 7-6,7-8, 7-9
16-Mar	Spring Break				
23-Mar	EM Plane Waves	Fowles Ch 1	#7	(no lab)	#6 Fowles 1.2,1.3,1.5,1.6
30-Mar	Polarization	Fowles Ch 2	#8	Polarization	#7 Fowles 2.1, 2.3, 2.8, 2.10, 2.12
6-Apr	Reflection & Refraction	Fowles Ch2	#9	Reflection & Refraction, Thin lens	Lab report #2 Polarization
13-Apr	Review			(no lab)	Midterm 2
20-Apr	Ray Optics	Fowles Ch 10, pp294 - 301	#10	Ray Optics	#8 2.16, 2.17, 2.22, 10.2, 10.4, 10.5
27-Apr	Interferometers	Fowles Ch 3,4	#11	Interferometers	#9 Fowles 3.2, 3.3, 4.1 (see eqns 4.9 and 4.20), 4.5
4-May	Diffraction	Fowles Ch 5	#12	Diffraction	#10 Fowles 5.4, 5.9, 5.12 (Note typo, should be 2h/b+1)

16-Mar Fall break

6-Mar Midterm 1 covers worksheets #1 - #4

3-Apr GPNC, W deadline

17-Apr Midterm 2 covers worksheets #5 - #9

15-May 11:15am - 1:45pm, Final exam, covers 50% worksheets #1- #9, 50% #10 - #13