PHY300, Waves and Optics, Spring 2025 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
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Laszlo.mihaly@stonybrook.edu Office Hours Thursday 2:30-3:30pm
Teaching Assistants:
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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: http://solidstate.physics.sunysb.edu/teaching/2025/phy300/

Grading: HW 15%, Midterm Exams 30%, Worksheets 5%, Lab reports 20%, Final Exam 30%

Course format: Lectures and laboratory experiments are integrated in Studio Physics format.

1. A worksheet will be posted on the course WEB site for each week. Worksheets must be initialed by the TAs each day. The finished worksheets are due on Monday of each week in class.
2. Two written lab reports are a required part of the course. The data collection must be done by the student, either alone or in a small group setting. The lab reports must be completed and handed in for grading otherwise no passing grade can be received in the course.
3. Homework and Lab Reports are due on Friday in class. HW solutions will be posted on the course website.
4. No late HW, worksheets or lab reports will be accepted.

Learning objectives

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

Exams. There will be two midterms and one final exam. The midterms are in the regular lecture room, during class time, see the attached course schedule. The exams are closed books, no external help. A formula sheet will be given with the exam. Missed exams will be excused if a doctor's note is submitted. For the midterms there is no make-up exam. Instead, the other midterm's result will count twice for the calculation of the final grade. For getting a passing grade, the final exam must be completed.

Working With Classmates is allowed and encouraged, but the written solutions of the HW problems, worksheets and lab reports must be produced by each student individually. Copying is not allowed.

Artificial Intelligence (AI)
The use of AI is allowed and encouraged, except during exams. Consulting, for example, ChatGPT can give ideas about how to start the solution of a homework problem. Please note that ChatGPT makes occasional mistakes. Discovering the error in ChatGPT's reasoning is also very educational.

Religious Holidays: If the schedule of home works, exams or other assignments is in conflict 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 in 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.

Americans With Disability Act: If you have a physical, psychological, medical or learning disability that may impact your ability to carry out assigned course work, contact the staff in the Disabled Student Services office (DSS), 128 Educational Communications Center, 632-6748/9. DSS will review your concerns and determine with you what accommodations are necessary and DSS will advise me. All information and documentation of disability is confidential.

University 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 are 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 at:

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 Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Week of	Topic	Reading	Worksheet	Friday Lab	Homework/Lab Reports
27-Jan	Simple Harmonic Oscillator	French Ch 1, 2	#1	Simple Harmonic Oscillator	
3-Feb	Damping, Driving, Energy	French Ch 3,4	#2	Damped Oscillator	#1 French 1-1,1-2,1-5,1-6, 2-1,2-2,2-3,2-4
10-Feb	Two Coupled Oscillators	French Ch 5	#3	Two Coupled Oscillators	#2 French 3-1,3-2,3-3, 3-13,4-3,4-5,4-10, 4-13, (Bonus: 3-18)
17-Feb	N Coupled Oscillators	French Ch 5	#4	LC Circuits	#3 French 4-16, 5-2, 5-4, 5-9, 5-10
24-Feb	Strings, Fourier Series	French Ch 6	#5	String Demo	Lab report #1 Coupled Oscillators
3-Mar	Review				Midterm 1
10-Mar	Travelling Waves	French Ch 7	#6	Vibrating Rod, Sound waves	#4 French 6-1,6-2,6-6, 6-11, 6-12,6-14
17-Mar	Spring Break				
24-Mar	EM Plane Waves	Fowles Ch 1	#8		#5 French 7-1, 7-2,7-3,7-4, 7-5,7-6,7-8, 7-9, (Bonus: 7-16)
31-Mar	Polarization	Fowles Ch 2	#9	Polarization	#6 Fowles 1.2,1.3,1.5,1.6
7-Apr	Reflection & Refraction	Fowles Ch2	#10	Reflection & Refraction	#7 Fowles 2.1, 2.3, 2.8,2.10,2.12
14-Apr	Review				Midterm 2
21-Apr	Interferometers	Fowles Ch 3,4	#11	Interferometers	Lab report #2 Polarization
28-Apr	Diffraction	Fowles Ch 5	#12	Diffraction	#8 Fowles 2.16,2.172.22,3.6, 4.1 (see eqns 4.9 and 4.20), 4.5
5-May	Ray Optics II & Review	Fowles Ch 10	#13	Ray Optics	#9 Fowles 5.4,5.9,5.12 (Note Typo should be 2h/b+1), 10.5,10.6,10.7

17-Mar Spring Break

7-Mar Midterm 1 covers homeworks #1 - #3

11-Apr Midterm 2 covers homeworks #4 - #6

16-May 11:15am - 1:45pm, Final exam, covers 50% new material, 50% covered by midterms 1 and 2