

PHYS 3208 Syllabus

Modern Optics Lab

Fall 2026

In-Person Mandatory Attendance Lab Course

General Course Information

Description

Physics 3208 provides hands-on experiences with key optics principles, including light reflection and refraction, imaging and lensing, polarization, and diffraction.

Pre- &/or Co-Requisites

Ideally, a lecture course in optics (e.g., PHYS3232) would be taken concurrently with (or prior to) this lab; however, course scheduling realities at Georgia Tech may prevent you from enrolling in that course. If you are in that situation, you will be expected to acquire a basic knowledge of both ray optics and wave optics, so do plan on doing some reading - I am available to help you with pointers and resources as needed to help you get up to speed.

Course Goals and Learning Outcomes

Develop an understanding of:

- (1) Reflection and refraction of light.
- (2) Lens equations/lenses in common optical instruments
- (3) Diffraction of light
- (4) The polarization of light, and the use of polarizers and half- and quarter-wave retarders
- (5) Interferometry
- (6) Laser operation and use, including beam characterization (Gaussian and Laguerre-Gauss beams) and wavelength adjustment via optical feedback.
- (7) Photodiodes and camera (CCD/CMOS) sensors for quantitative optics measurements.
- (8) Methods of data analysis for characterizing optical systems.
- (9) Scientific communication.

Course Requirements & Grading

Each lab will have a corresponding report, to be submitted by the appropriate deadline. Each lab beyond the first will have a pre-lab, to be submitted by the appropriate deadline. Late work incurs a 15%/day penalty unless alternative arrangements have been made *beforehand*. There are 12-13 planned experiments.

Description of Graded Components

Labs are worth 100 points and pre-labs worth 18 points. Typically, two lab sessions should be enough to complete the experiment requirements. Detailed rubrics are provided for each lab. An example lab report is included in the "Files" section and the pre-labs are self-explanatory (as described in the matching lab assignment sheet).

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Extra Credit Opportunities

I am willing to accept revisions to labs, including acquisition of new data, provided that a "good faith" effort was made to complete the assignment by the deadline. This is subject to my judgement but basically if you try to throw something together at the last minute and then re-submit a final version the next week, I will deduct points. If you need an extension and you have a justification you may request it ahead of time to avoid this.

Course Materials

There are no required textbooks. However, here are several books that you might consider acquiring if you would like a deeper understanding of the optical phenomena that we will be studying:

Steck, "Classical and Modern Optics" (you can download this for free from:
<http://atomoptics.uoregon.edu/~dsteck/teaching/optics/>

Trebino, "Optics Course" (aka PHYS3232, you can view these lectures
https://1drv.ms/f/c/651160a0fab1c3ef/Eu_DsfqgYBEggGUbAQAAAAABLpZubhJQg_e0zqsBY4fzuQ?e=YjLL5n

Hecht, Schaum's Outlines in Optics, (McGraw Hill, 1975)

Fowles, "Introduction to Modern Optics," 2nd edition, (Dover, 1975)

Hecht, "Optics," 4th edition (Addison Wesley, 2002)

Course Policies, Expectations, & Guidelines

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. [Review Georgia Tech's Honor Code](#) and the [student Code of Conduct](#).

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, [contact the Office of Disability Services](#) (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Collaboration & Group Work

Every student is expected to complete the optical measurements as part of a two-person team (pair). Discussion among students, including outside the pairs, is allowed, but each lab report should be written entirely by its author - duplication of any section of another student's report, including the partner, or uploading data or apparatus photos from another team is considered plagiarism.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

If you need an extension and you have a justification you may request it at least one day ahead of time to avoid late penalties.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. [The Student-Faculty Expectations](#) articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Graduate Student Academic and Professional Success Resources: A list of resources for graduate students is given on the Office of Graduate and Postdoctoral Education website. Specific information for current graduate students includes

- Academic Resources such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- Student Resources such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide

Student Well-Being: At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being.