

PHYSICS 251: WAVES, OPTICS, AND THE BREAKDOWN OF CLASSICAL PHYSICS

University of Tennessee, Spring 2025

Instructor:	Prof. Holmes	Time:	Tue./Thu. 2:15 – 3:45 PM
Email:	tholmes@utk.edu	Place:	Nielsen 304

Canvas page: <https://utk.instructure.com/courses/194933>

Teaching assistants: TBA

Office Hours: TBA

You can also visit the Tutorial Center any time for physics help; it's on the 5th floor of Nielsen all the way at the end of the hallway.

Main text: OpenStax University Physics, Volumes 1 and 3 (Free and online)

Supplemental texts: R. Shankar, Fundamentals of Physics I and II (You are not required to purchase these, but I will draw some content from them, and you may find them useful. If you're looking for a bit more depth and context than what OpenStax provides, I highly recommend them.)

Overview: Welcome to Physics 251! This course explores oscillations, waves, optics, and the revolution in physics that led to our modern understanding of the world. We'll meet every Tuesday and Thursday at 2:15 PM, and you'll have a lab section on Fridays. This semester, we'll learn about simple harmonic motion, the behavior of light, special relativity, and lay the groundwork that leads into Physics 252, Quantum Physics and Applications.

Structure: During Tuesday and Thursday time slots, we'll do a mix of lecture and problem-solving in class. Fridays will alternate between laboratory and computational work. Before each Tuesday's class, you'll be expected to read the relevant textbook sections. Homework covering the previous week's content will be due each Thursday. Laboratory/computational assignments should typically be completed during your in-class hours, but they can be handed any time before the following Friday.

Tentative Course Outline:

Week 1	■	Uncertainty and Coding	External
Week 2	■	Periodic Motion	Vol I, Ch. 15
Week 3	■	Mechanical Waves	Vol I, Ch. 16
Week 4	■	Sound	Vol I, Ch. 17
Week 5	■	Light	Vol III, Ch. 1
Week 6	■	Exam 1	None
Week 7	■	Geometric Optics	Vol III, Ch. 2
Week 8	■	Interference	Vol III, Ch. 3
Week 9	■	Spring Break	None
Week 10	■	Diffraction	Vol III, Ch. 4
Week 11	■	Relativity	Vol III, Ch. 5
Week 12	■	Exam 2	None
Week 13	■	Relativity & Spring Recess	External
Week 14	■	Failures of Classical Physics	Vol III, Ch. 6
Week 15	■	Photons	None
Week 16	■	Review	None

Tentative Grading Breakdown: Homework assignments (30%), labs and computational assignments (30%), exams (30%), reading assignments (10%). No assignments will be dropped, but extra credit opportunities will be given throughout the semester. To pass the course, you must have at least a 60% on your overall lab score.

Course Policies:

- **Code of Conduct:** This class welcomes people with many different experiences and backgrounds, all of whom should feel comfortable participating in group work and discussion. Questions should be asked and answered respectfully. No forms of harassment, including any form of abuse or exclusionary jokes, will be tolerated in the classroom or in any online forums.
- **Pronouns and Preferred Names:** I'm happy to address you by a preferred name and gender pronoun – just send me an email or come talk to me if you'd like to let me know what they are.
- **Academic Integrity:** Please do not cheat. If you find yourself struggling with material, please reach out to me or your TA, and we'll be more than happy to help. It's why we're here. All work submitted must be your own, and any sources used must be properly cited. Using solution manuals or websites like Chegg is considered cheating. Students must not seek the assistance of Generative AI Tools like ChatGPT. Use of a Generative AI Tool to complete an assignment constitutes academic dishonesty. If you're found to be cheating on an assignment you will get 0 credit for it. Depending on the scale of the offense, you may be reported for academic integrity violations, and may receive additional grade penalties.
- **Late Assignments:** If you need an extension on an assignment, please email me in advance with the request. I will be much more generous if you ask beforehand. Unexcused late work will have a penalty of -20% per day.
- **Tentative Grading Scale:**

Grade	Percentage	Grade	Percentage
A	≥ 93	C	$\geq 73, < 77$
A-	$\geq 90, < 93$	C-	$\geq 70, < 73$
B+	$\geq 87, < 90$	D+	$\geq 67, < 70$
B	$\geq 83, < 87$	D	$\geq 65, < 67$
B-	$\geq 80, < 83$	F	< 65
C+	$\geq 77, < 80$		

- **Lab Attendance:** Lab attendance is strictly required, and assignments turned in without physical presence will be given a 0. You are expected to arrive on time, and leave early only if the lab is fully completed. If extenuating circumstances prevent you from attending a lab, please contact your TA beforehand if possible, and as quickly as possible if not. Opportunities for make-up labs will be evaluated on a case-by-case basis, and you may be asked for documentation. To pass the course, you must have at least a 60% on your overall lab score.
- **Lab Report Grading:** Labs will be submitted through Canvas as a single PDF, by each student individually. Labs will be graded as follows:
 - Completion - 50%: Answering all questions; giving all supporting materials required (tables, graphs, etc) in the lab, and following the lab report template.
 - Accuracy and understanding - 50%: Accurately finding the data within the lab and showing an understanding of the material throughout the lab report.

University Policies:

- **Academic Integrity:** An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.
- **University Civility Statement:** Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability and courteousness. Civility enhances academic freedom and integrity, and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other's well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus: <http://civility.utk.edu/>.
- **Physics & Astronomy Civility Statement:** As a department, we are committed to creating an environment that welcomes all people, regardless of their identities. We value the diversity that enriches our department. We understand the importance of free and open dialogue that includes the free exchange of ideas. We do not tolerate uncivil speech or any form of discourse that infringes on others' rights to express themselves, or has a negative impact on their education, or work environment. We actively promote an environment of collegiality and an atmosphere of mutual respect and civility. We understand that respect includes being considerate of others' feelings, circumstances, and their individuality. We recognize the necessity of a civil community in realizing the potential of individuals in teaching, learning, research, and service. We believe these values extend beyond the department into our work within physics regionally, nationally, and internationally, as well as work and studies in the university, and the broader community. We encourage all members of the department to intervene and report any incidents involving bigotry, or that violate the university code of conduct.

- **Reporting:** Anyone who experiences or observes any such incident is encouraged to report it to the Department Head or one of the Associate Heads. Students can also speak to any faculty or staff member with whom they feel comfortable. Incidents that involve sexual harassment or stalking will be reported to the office of Title IX under mandatory reporting requirements. Additional resources and reporting available at: <http://www.phys.utk.edu/about/civility-community.html>.
- **Disability Services:** The University of Tennessee, Knoxville, is committed to providing an inclusive learning environment for all students. If you anticipate or experience a barrier in this course due to a chronic health condition, a learning, hearing, neurological, mental health, vision, physical, or other kind of disability, or a temporary injury, you are encouraged to contact Student Disability Services (SDS) at 865-974-6087 or sds@utk.edu. An SDS Coordinator will meet with you to develop a plan to ensure you have equitable access to this course. If you are already registered with SDS, please contact your instructor to discuss implementing accommodations included in your course access letter.