

Physics 031: Introduction to Quantum Mechanics

Lehigh University, Fall 2024

Instructor:	Timm Wrase, Lewis Lab 418 timm.wrase@lehigh.edu
Office hours:	Wednesdays 2-3pm or simply stop by my office or email me
Class time and place:	Tuesdays and Thursdays 9:20-10:35am, Lewis Lab 511
Textbook:	Kenneth S. Krane <i>Modern Physics</i>
Reading:	Sections in the book will be assigned as reading material.

Overview: This course will introduce special relativity and quantum mechanics – two amazing scientific developments of the 20th century that revolutionized our understanding of the physical world. In particular, we will cover chapters 2-8 from the textbook.

Initial Competencies: Physics prerequisites for this course are either Physics 013 or 021 or 023. You should have also completed Math 022.

Final Competencies: After taking this course, students will be able to solve basic problems in special relativity and quantum mechanics. In particular, they will have the following skills:

- Apply the concepts of length contraction, time dilatation as well as the relativistic velocity addition.
- Understand the conservation of momentum and energy at relativistic speeds. Predict the dynamics of relativistic collisions.
- Use the Schrödinger equation to calculate the energy levels and eigenstates of particles in free space and potential wells, including the harmonic oscillator.
- Understand the hydrogen atom and identify the allowed quantum numbers for spin and angular momentum.

Homework: Homework will be assigned each Thursday and is due the following Thursday in class. You may work together on the homework, but please make sure that you are able to complete the problems on your own. The work turned in must be your own.

Quizzes: Short in-class quizzes will be given each Tuesday. This allows you to demonstrate your understanding and will provide individual feedback. Your lowest quiz score will be dropped.

Exams: The course will have two midterm exams: one on October 3rd and one on November 7th. The final exam date will be decided later in the semester by the registrar's office. The final will be comprehensive and will consist of three sections.

Grading: Final grades in the course will be based on homework (20%), quizzes (10%), midterms (20% each) and the final exam (30%).

Accommodations for Students with Disabilities: Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at indss@lehigh.edu, or online at <https://studentaffairs.lehigh.edu/disabilities>.

The Principles of Our Equitable Community: Lehigh University endorses [The Principles of Our Equitable Community](#). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

Important Dates:

09/05/2024: HW1 due

09/12/2024: HW2 due

09/19/2024: HW3 due

09/26/2024: HW4 due

10/03/2024: Midterm I

10/10/2024: HW5 due

10/17/2024: HW6 due

10/24/2024: HW7 due

10/31/2024: HW8 due

11/05/2024: *Civic engagement day, no class*

11/07/2024: Midterm II

11/14/2024: HW9 due

11/21/2024: HW10 due

11/27/2024-11/29/2024: *Thanksgiving break, no class*

12/05/2024: HW11 due

12/17/2024: Final Exam (date to be determined by registrar office)