

# PHY 031. Introduction to Quantum Mechanics

Fall 2018

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Time and Location: Tuesday & Thursday 9:20-10:35, Lewis Lab 514

Office hours: Thursdays 8:20-9:20 AM in Lewis 416 (we will move to 514 if more space is needed), or otherwise by appointment (please request appointments by email).

## Description

This course provides a calculus-based introduction to the fundamental concepts of quantum mechanics, beginning with a brief overview of relativity. Handouts, homework assignments, and homework solutions will be posted on the Coursesite.

We will cover the following chapters of the text:

- Chapter 2. The special theory of relativity.
- Chapter 3. Particle-like properties of electromagnetic radiation.
- Chapter 4. Wave-like properties of particles.
- Chapter 5. The Schrödinger equation.
- Chapter 6. The Rutherford-Bohr model of the atom.
- Chapter 7. The hydrogen atom in wave mechanics.
- Chapter 8. Many-electron atoms.

## Initial Competencies

Physics prerequisites for this course are either Physics 013 or 021 or 023. You should have completed Math 022, and either already have taken Math 205, or be taking it concurrently.

## Final Competencies

1. After completing course, you will be able to solve basic problems in quantum mechanics by applying the concepts and techniques covered in lecture.

2. Students passing this course will be prepared for continuing study in courses such as Phys 355 (Nonlinear Optics), Phys 362 (Atomic and Molecular Structure), Phys 364 (Nuclear and Elementary Particle Physics) and Phys 369 (Quantum mechanics).

## Grading

Homework will be assigned each week and is due one week after it is posted (on Tuesdays, by 5 PM). Homework will be graded and returned as quickly as possible. It is your responsibility to make sure you understand how to do the homework problems. I encourage you to work together to complete the homework, but also make sure that you are able to complete the problems on your own. Your ability to do this will be assessed by weekly in-class quizzes. Work on exams and quizzes must be only your own. During quizzes and exams, calculators are allowed but not paper notes or cell phones, so please bring calculators to class on Thursdays.

Homework resubmission: you can turn in a revised, corrected version of a homework assignment anytime before the day of the corresponding midterm. You can make up 50% of the points you missed by turning in this version.

There will be two midterm exams, one during week 5 (September 27th) and one during week 12 (November 15th). The final exam date will be announced.

The final grade will be based on:

1. **Homework (30%) and quizzes (10%).**
2. **Two midterm exams (15% each) and one final exam (30%).**

If you notify me in advance that you will miss a quiz or exam, I will schedule an alternative time for you to take it. After it's been missed, you may take a quiz or exam for 50% of the possible points. The final exam will be comprehensive and consist of three sections. You can also replace your lowest midterm exam score with your score from the corresponding section of the final exam.

## Textbook (required)

[1] Kenneth Krane, *Modern Physics*. (Third edition. John Wiley and Sons, New York, 2011).

## Additional Textbooks (optional)

[1] David J. Griffiths, *Introduction to Quantum Mechanics* (Pearson Education Inc., 2005).

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center 212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

The Principles of Our Equitable Community:

Lehigh University endorses The Principles of Our Equitable Community ([http://www.lehigh.edu/inprv/initiatives/PrinciplesEquity\\_Sheet\\_v2\\_032212.pdf](http://www.lehigh.edu/inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf)). 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.

The University strongly encourages (and, depending upon the circumstances, may require) students, faculty, staff or visitors who experience or witness harassment or discrimination, or have information about harassment or discrimination in University programs or activities, to immediately report such conduct.

Reports or inquiries should be made to: Karen A. Salvemini, Equal Opportunity Compliance Coordinator, Alumni Memorial Building / 610.758.3535 / [eocc@lehigh.edu](mailto:eocc@lehigh.edu)

In the event that the conduct involves the Equal Opportunity Compliance Coordinator, reports should be made to: Judy A. Zavalydriga, Human Resources Investigator, 428 Brodhead Avenue / 610.758.3897 / [jaz308@lehigh.edu](mailto:jaz308@lehigh.edu)

Resources for students:

Counseling office:

Counseling and Psychological Services

36 University Drive

Johnson Hall, 4th Floor

Bethlehem, PA 18015

Phone: (610) 758-3880

Fax: (610) 758-6207

Hours: M-F, 8:00 AM - 5:00 PM

<http://studentaffairs.lehigh.edu/content/counseling-psychological-services-ucps>

Gender violence:

University Center C112 and C108

Phone: 610-758-1303

Fax: 610-758-6164

E-mail: [ingves@lehigh.edu](mailto:ingves@lehigh.edu)

<http://studentaffairs.lehigh.edu/content/gender-violence-education-support>