Physics 031 – Introduction to Quantum Mechanics
Spring 2024
TR 9:20 – 10:35 am
Venue: Lewis Lab. 511[1]

https://lehigh.zoom.us/j/96242476582?pwd=YXVRYlY0TURiTnc4cmcyN0RDQUdJZz09

Instructor:

Chinedu E. Ekuma
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Office hours: Walk-in anytime or by appointment. I am around most of the time, so this should not be difficult for you to arrange. I encourage you to come and see me whenever you have questions. You are expected to have at least two office hours.

Main Textbook:

Kenneth S. Krane,Modern Physics, 3^{rd} edition, John Wiley & Sons.

Other reading materials that you may also find helpful:

OpenStax, University Physics Volume 3, 2016
URL: https://openstax.org/details/books/university-physics-volume-3

Overview:

This an introductory course on one of the most magnificent intellectual accomplishments of the 20th century - special relativity and quantum mechanics - that revolutionized our understanding of the physical world. In particular, we will cover the following chapters:

1. Chapter 2 Special Theory of Relativity
2. Chapter 3 Particlelike Properties of Electromagnetic
3. Chapter 4 Wavelike Properties of Particles
4. Chapter 5 The Schrodinger Equation
5. Chapter 6 Rutherford-Bohr Model of the Atom
6. Chapter 7 The Hydrogen Atom in Wave Mechanics
7. Chapter 8 Many-Electron Atoms[2]

Initial Competencies:

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

[1] Zoom link included below should we need to go remote class
[2] If time permits, either Chapter 14 or 15

Final Competencies:

At the end of this course, students will gain fundamental knowledge of modern physics and will be able to solve basic problems in special relativity and quantum mechanics. In particular, they will have the following skills:

- Fundamental understanding of modern physics
- 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
- Formulate & use the Schrodinger equation to calculate the energy levels and eigenstates of particles in free space, potential wells, and box, including the harmonic oscillator
- Understand the hydrogen atom and identify the allowed quantum numbers for spin and angular momentum

Homework:

Homework will be assigned on weekly basis. The homework assignments are designed for learning than for grades. Homework will be graded on efforts rather than just the correct answer. As such, I encourage you to work as a diverse team and with each other on the homework assignments. My door is always open, and you are welcomed to come and see me if you need help. You must turn in the homework assignments to receive a passing grade in the course. Late homework without any valid reason will be penalized by 10% per day. If for any reason you are not able to the complete homework assignments on time, please, reach out to me as soon as you can.

Quizzes:

Short in-class quizzes will be given at least once per week. The quizzes will provide an opportunity for you to demonstrate your understanding of the material and receive feedback.

Exams:

Exams will be in-class unless agreed otherwise. There is no collaboration of any kind on exams. The use of any materials not explicitly permitted will be considered as a form of cheating. Such act will be referred to the Disciplinary Committee. The use of Phones in and around the exam rooms will not be tolerated and anyone caught in the act may earn a grade of zero in the exam.

Missed Exams:

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. Without approved request to miss a quiz or exam, you may take it for 50% of the possible points.

Class Attendance:

Attendance is strongly recommended.

Grading will be determined as follows:

Homework	–	20%
Quiz	–	10%
Exam 1	–	20%
Exam 2	–	20%
Final Exam	–	30%

Feedback:

Come and talk to me about anything you may be struggling with and give me your honest feedback! This can help me readjust the course and address specific areas that might not be familiar to some of you.

Use of Technology

As we continue to advance in technology and artificial intelligence, it is important that we learn how to effectively utilize these resources in our educational endeavors. ChatGPT is one such resource that can be used to enhance learning and support research. However, it is crucial that we use it in an ethical and responsible manner, adhering to principles of educational integrity. As a student, you are encouraged to use ChatGPT as a tool for generating ideas, conducting research, and expanding your understanding of the course material. However, it is important that you properly cite any information obtained from the model in your work and fact-check it with other sources to ensure its accuracy and appropriateness. It is also important to note that cheating or plagiarism, including using ChatGPT to complete assignments or exams, will not be tolerated and will result in consequences such as a failing grade on the assignment or exam and potential disciplinary action from the university. In summary, while ChatGPT can be a valuable asset in the classroom, it is important to use it ethically and responsibly to maintain educational integrity and enhance your learning experience.

Class and University Policies

Accommodation 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 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.

Academic Integrity/Code of Conduct:

It is our shared fundamental responsibility to promote and ensure academic integrity. Collaborate with other students is strongly encouraged and any group with more diversity in their team will have an extra day to turn in their homework assignments. Referencing outside materials for homework assignments are encouraged but verbatim copying including from each other is considered plagiarism. Any student found to have engaged in academic misconduct on a graded assignment or exam may be assigned a grade of zero, assigned an F in the course, and will be referred to the Disciplinary Committee. The vignettes are available at http://www.lehigh.edu/lts/official/Academic_Integrity_Vignettes.pdf.