Phys 2565: Non-Relativistic Quantum Mechanics I
Fall 2020

Course Information:

Zoom access	https://pitt.zoom.us/j/91527425601, passcode 324391
Location	*300 Old Engineering Hall*
Lecture	Monday, Wednesday, Friday 11:05 – 11:55
Text	*Principles of Quantum Mechanics, 2nd Edition,* Shankar
Professor	Adam Leibovich
Contact info	email akl2@pitt.edu (please put Physics 2565 in the subject line)
Office	414 Allen Hall
Office hours	Wednesday 1:30-3:00, https://pitt.zoom.us/j/96713857101 Thursday 3:00-4:00, https://pitt.zoom.us/j/97571696960 or by appointment

These are obviously unusual times. I have never had to teach a graduate course remotely, so we all will be learning as we go along. We will all need to remain as flexible and adaptive as possible. I am expecting that most of the class, if not all, will be taught remotely. If we do have any in-class component, I will discuss it with you beforehand. The room can only hold 16 people at the low density required, so we would have to have any in-person components in shifts.

I am also very much interested in hearing what works best from you for the instruction given the remote aspect of the class. Do you want synchronous lecturing? Do you want asynchronous lectures and then spend class time on questions and example problems or group work? My plan is to have a discussion the first day of class and adapt the course to your preferences. I also want you to speak up as the semester goes long about any problems, concerns, or suggestions to help with the class.

Course Description and Objectives: This course is the first of a two-term introductory sequence on non-relativistic quantum mechanics. For some of you, much of this course may be a review, but it is important to have a deep understanding of the principles of quantum mechanics in order to understand advanced topics. Topics to be covered in the first term include: review of mathematical concepts, the postulates of quantum mechanics, one-dimensional problems, the harmonic oscillator, the path integral approach to quantum mechanics, symmetries and angular momentum, the Hydrogen atom, spin, addition of angular momentum.

Class Participation: I encourage you to participate fully in class discussions. I strongly encourage you to ask questions to clarify any doubts. There is no such thing as a dumb question. Chances are, if you are confused, someone else in the class is also confused, which means that I did not do a good enough job explaining something. Please stop me when this happens, so I can try again.

Textbook: *Principles of Quantum Mechanics 2nd Ed*, by R. Shankar is the required book for this course. Many of the homework problems will be taken from this textbook.

Homework: Problem-solving skills are important to learning and understanding physics and so homework is an important part of the course. Homework will usually be due Friday by the start of class. The next problem set will be posted at least one week in advance. There will be approximately 12 homework sets during the semester. Working through homework assignments and other practice problems is the single best way to learn the material. As a practical matter, it will be important to practice the material in order to perform well on the exams. You may work on the homework together (in fact, that is encouraged), but everyone must turn in an independently prepared problem set.

Exams: There will be one mid-term exam and a final examination. The formats of the exams are still to be determined. The exams are expected to fall on:

- Exam 1: Wednesday, October 7
- Final: Friday, December 4

Course Grades: Your grade in the course will be based on homework and exams. The grades will be weighted according to the table below:

Homework	20%
Midterm Exam	40%
Final Exam	40%

Rough timeline:

Given the extraordinary circumstances that we find ourselves in, this timeline will almost definitely change. However, to give a sense of how I expect the class to flow, here is the very rough timeline.

Mathematical Introduction	6 lectures
Postulates of Quantum Mechanics	4 lectures
One-dimensional Problems	3 lectures
The Harmonic Oscillator	4 lectures
Path Integral	2 lectures
Heisenberg Uncertainty Relations	1 lecture
Systems with *N* Degrees of Freedom	4 lectures
Symmetries	3 lectures
Angular Momentum	5 lectures
The Hydrogen Atom	3 lectures
Spin	3 lectures
Addition of Angular Momentum	3 lectures

Course policies:

Late work and exam conflicts:

Students may obtain an excused absence, and special arrangements may be made if a student is unable to participate in a course requirement (e.g., an exam) for good cause, such as illness or other serious circumstance beyond a student's control and preventing participation. In the occurrence of such good cause, the student must inform the instructor immediately.

In general, late homework submissions will not be accepted, without good cause.

Special or make-up examinations may be given in the case of an excused absence. A student's failure to take a scheduled examination without good cause and without proper notice will result in that student's receiving a 0% grade for that exam.

General Grading Guidelines:
No credit will be given for correct answers that do not give proper justification.
No credit will be given for answers that do not have appropriate units (where applicable).
Partial credit will be given for incorrect answers if you acknowledge that your answer is incorrect, describe the manner in which you determined your answer to be incorrect, and speculate on the cause of the error.
No credit will be given for work that is illegible or so disorganized that it is difficult for the Instructor to follow. Your work must flow sequentially from left to right across the page and from top to bottom down the page. No credit will be given for work if the sequence of steps is difficult to determine. These rules will be enforced even if your final answer is correct. It is your responsibility, and your responsibility only, to present your work in a manner that is clear, well-organized, and legible.

Academic Integrity: Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.
To learn more about Academic Integrity, visit Academic Integrity Guide for an overview of the topic. For hands-on practice, complete the Understanding and Avoiding Plagiarism tutorial.

Disabilities Services: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Health and Safety Statement: In the midst of this pandemic, it is extremely important that you abide by public health regulations and the University of Pittsburgh health standards and guidelines. While in class, at a minimum this means that you must wear a face covering and comply with physical distancing requirements; other requirements may be added by the University during the semester. These rules have been developed to protect the health and safety of all community members. Failure to comply with these requrieemsnt will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu and check your Pitt email for updates before each class.

Accessibility: The Canvas LMS platform was built using the most modern HTML and CSS technologies, and is committed to W3C's Web Accessibility Initiative and Section 508 guidelines. Specific details regarding individual feature compliance are documented and updated regularly.

Diversity and Inclusion: The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see: https://www.diversity.pitt.edu/civil-rights-title-ix-compliance/policies-procedures-and-practices.

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu. Reports can also be filed online: https://www.diversity.pitt.edu/civil-rights-title-ix-compliance/make-report/report-form. You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

Gender Inclusive Language Statement: Language is gender-inclusive and non-sexist when we use words that affirm and respect how people describe, express, and experience their gender. Just as sexist language excludes women's experiences, non-gender-inclusive language excludes the experiences of individuals whose identities may not fit the gender binary, and/or who may not identify with the sex they were assigned at birth. Identities including trans, intersex, and genderqueer reflect personal descriptions, expressions, and experiences. Gender-inclusive/non-sexist language acknowledges people of any gender (for example, first year student versus freshman, chair versus chairman, humankind versus mankind, etc.). It also affirms non-binary gender identifications, and recognizes the difference between biological sex and gender expression. Students, faculty, and staff may share their preferred pronouns and names, and these gender identities and gender expressions should be honored.

Take Care of Yourself: Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking time to relax. Despite what you might hear, using your time to take care of yourself will actually help you achieve your academic goals more than spending too much time studying. All of us benefit from support and guidance during times of struggle. There are many helpful resources available at Pitt. An important part of the college experience is learning how to ask for help. Take the time to learn about all that's available and take advantage of it. Ask for support sooner rather than later – this always helps. If you or anyone you know experiences any academic stress, difficult life events, or difficult feelings like anxiety or depression, we strongly encourage you to seek support. Consider reaching out to a friend, faculty or family member you trust for assistance connecting to the support that can help.

The University Counseling Center is here for you: call 412-648-7930 and visit their website.

If you or someone you know is feeling suicidal, call someone immediately, day or night:
University Counseling Center (UCC): 412 648-7930
University Counseling Center Mental Health Crisis Response: 412-648-7930 x1 Resolve Crisis Network: 888-796-8226 (888-7-YOU-CAN)

If the situation is life threatening, call the Police: On-campus: Pitt Police: 412-268-2121
Off-campus: 911