Quantum Mechanics (PHY507) Fall 2021

Instructor:Rafi UllahOffice:9-115A, 1st Floor SBASSEOffice Hours:Tuesday and Thursday 2:00 – 3:00 PMEmail:rafiullah@lums.edu.pkWebsite:https://qsim.lums.edu.pk/index.php/teaching/quantum-mechanics-fall-2021/

Grading Scheme

- Quizzes, Class Participation, and Attendance: 20% (will include surprise oral/written quizzes)
- Homeworks: 20% (will include optional face-to-face discussion and cross examination of the submitted homeworks)
- Mid-Term: 20% (will include an optional oral exam)
- Final Exam: 40% (will include an optional oral exam)
- Grading will be absolute.
- The instructor has the liberty of varying these grade assignments by 10%.
- The grading breakup is subject to change if the teaching shifts to online modality.

Harassment Policy

Harassment of any kind is unacceptable, whether it be sexual harassment, online harassment, bullying, coercion, stalking, verbal or physical abuse of any kind. Harassment is a very broad term; it includes both direct and indirect behavior, it may be physical or psychological in nature, it may be perpetrated online or offline, on campus and off campus. It may be one offense, or it may comprise of several incidents which together amount to sexual harassment. It may include overt requests for sexual favors but can also constitute verbal or written communication of a loaded nature. Further details of what may constitute harassment may be found in the LUMS Sexual Harassment Policy, which is available as part of the university code of conduct. LUMS has a Sexual Harassment Policy and a Sexual Harassment Inquiry Committee (SHIC). Any member of the LUMS community can file a formal or informal complaint with the SHIC. If you are unsure about the process of filing a complaint, wish to discuss your options or have any questions, concerns, or complaints, please write to the Office of Accessibility and Inclusion (OAI, oai@lums.edu.pk) and SHIC (shic@lums.edu.pk) —both of them exist to help and support you and they will do their best to assist you in whatever way they can. To file a complaint, please write to harassment@lums.edu.pk.

Academic Honesty

The principles of truth and honesty are recognized as fundamental to a community of teachers and students. This means that all academic work will be done by the student to whom it is assigned without unauthorized aid of any kind. Plagiarism, cheating and other forms of academic dishonesty are prohibited. Any instances of academic dishonesty in this course (intentional or unintentional) will be dealt with swiftly and severely. Potential penalties include receiving a failing grade on the assignment in question or in the course overall. For further information, students should make themselves familiar with the relevant section of the LUMS student handbook.

Honor Code

This course and all our interactions are based on the premise that students and I (Rafi Ullah) will not resort to any means of taking unfair advantage of one another. I will not penalize any student unfairly and will not unduly advantage another. I will stick to the norms of decency and mutual respect to my students. Similarly, students will also stick to an honor code - they will not cheat or help others cheat or plagiarize. I will not actively go out looking for plagiarism or cheating. However, if something comes to my notice, I will immediately refer this case to the School's Disciplinary committee for subsequent disciplinary action.

Course Description

This course introduces the basic framework of quantum mechanics with both introductory and advanced examples. It is designed to alleviate many of the weaknesses left over in traditional introductory quantum mechanics courses and revises and strengthens many concepts that usually create problems for students in other advanced courses that build on quantum mechanics. The course also introduces students to many advanced topics.

Lectures	Торіс
1 - 6	Introduction to basic formalism
	Linearity, operators, expectation values, wavefunctions, Dirac notation,
	postulates of quantum mechanics, time-dependent and time-independent
	Schrodinger wave equations
7 – 10	One dimensional problems
	Infinite square well, free particle, wavepacket, simple harmonic oscillator
11-14	Particle in a Coulomb potential
	Hydrogen atom, fine structure, hyperfine structure
15-17	Angular Momentum and Spin
18-19	Time-independent perturbation theory
20-21	Time-dependent perturbation theory
22-23	Identical particles
24-25	Band structure
26-28	Introduction to quantum computing

Tentative Course Schedule