Physics 455, Quantum Mechanics I
Fall Quarter, 2017

Location: CF 314, Time: Mon-Wed-Fri 2:00-2:50

Instructor: Armin Rahmani
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Office Hours: Wednesday and Friday, 1:00-2:00 or by appointment

Required Text: David J. Griffiths, Introduction to Quantum Mechanics, 2nd ed.

Optional Text: R. Shankar, Principles of Quantum Mechanics, 2nd ed.

Outline:

Topic	Griffiths	Shankar
Mathematical introduction/review	Appendix	Chap. 1
Wave function and probability	Chap. 1	Chap. 3
Time evolution, stationary states, free particle, infinite square well	2.1, 2.2, and 2.4	4.3, 5.1, and 5.2
Scattering in one dimension	2.5 and 2.6	5.4
Formalism (postulates, Hilbert space, operators)	Chap. 3	4.1 and 4.2
Harmonic oscillator	2.3	Chap. 7
The Hydrogen atom	4.1 and 4.2	13.1 and 13.2
Angular momentum and spin	4.3 and 4.4	12.4, 12.5, 14.2, 14.3, 15.1, and 15.2
Identical Particles	5.1	Chap. 10

Structure of class:

We will have lectures on Mondays and Wednesdays, while Fridays are generally left for problem solving and discussions. Both lectures and discussion sections are expected to be highly interactive. We will incorporate student-centered activities such as group discussions into the lectures. Quantum mechanics is both counterintuitive and technically challenging. It is almost impossible to develop a deep conceptual understanding and creative problem-solving skills without sharing your misconceptions with others. I am committed to maintaining an inclusive and respectful environment where all students can comfortably express themselves. Ask lots of questions! Chances are your questions will help the learning of your peers as well.

Homework:

Weekly assignments will be posted on Canvas and are due on Wednesday. The problems will have various degrees of difficulty. Working on the problem sets is essential for learning the subject matter. You can work on the homework in groups. While discussions and collaborations are encouraged, the final write-up must represent your own work (for more information on

academic integrity, see Western's Academic Integrity Website http://www.wwu.edu/integrity/) .

Assessment of learning:

Homework: 50%
Midterm Exam I: 10%
Midterm Exam II: 15%
Take-home Final Exam (Comprehensive): 25%

Grading scale:

94 - 100%	A	74 - 76%	C
90 - 93%	A-	70 - 73%	C-
87 - 89%	B+	67 - 69%	D+
84 - 86%	B	64 - 66%	D
80 - 83%	B-	60 - 63%	D-
77 - 79%	C+	0 - 59%	F

Learning objectives:

1) Gain a basic understanding of the postulates of quantum mechanics and their application to the dynamics of single-particle 1D and 3D systems. 2) Apply the operator formalism to quantum harmonic oscillators, spin, and the general theory of angular momentum. 3) Analyze the behavior of noninteracting multi-particle quantum systems.

Reasonable accommodation:

Western is committed to equal opportunity and nondiscrimination in all programs and activities. Requests for accommodation or assistance should be directed to Disability Resources for Students located in Old Main 120; additional information is available at: http://www.wwu.edu/depts/drs/ Telephone: 650-3083 / Email: drs@wwu.edu