

Physics 455, Quantum Mechanics I
Fall Quarter, 2018

Location: CF 314, **Time:** Mon-Wed-Fri 2:00-3:15

Instructor: Armin Rahmani

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Office Hours: Monday and Wednesday, 3:15-4:00 or by appointment

Required Text: David J. Griffiths, Introduction to Quantum Mechanics, 3rd 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 in the beginning of class followed by student-centered activities focused on problem solving (using worksheets) and discussions. All parts of the class are expected to be highly interactive. 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:

Regular assignments will be posted on Canvas. 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%

In-class midterm Exam: 20%

Take-home Final Exam (Comprehensive): 30%

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.wvu.edu/depts/drs/> Telephone: 650-3083 / Email: drs@wvu.edu