Quantum Mechanics I

Phys 342

January 27, 2020

Lectures: Monday, Wednesday, Friday 9:00-9:50 am (Physics 123)

		Office	Email
Lecturer	Andrew Larkoski	P124	larkoski@reed.edu
Office Hours	M 2–4 pm, W 3–4 pm, Th 10 am–12 pm		

Regarding Office Hours: You are required to visit my office hours at least once in the first 3 weeks of the course. We can talk about anything you'd like, related to the course or not. I use this requirement both to lower the barrier to getting help from faculty as well as a way to get to know each of you!

Text: The course will be based on my lectures, and I will provide written copies of lectures to students after each lecture.

Recommended Text: David J. Griffiths, Darrell F. Schroeter, "Introduction to Quantum Mechanics," 3rd Edition, Cambridge University Press, 2018.
This book is available at the Bookstore, or from online sellers. It is recommended, but not required, because it is a good resource and some of the homework will come from it.

Course Website: The syllabus, assignments and course schedule are available on my website, `http://people.reed.edu/~larkoski/phys342.html`.

Away February 17-21: I will be away the week of February 17 to Japan for a conference. In place of regular in-class lectures, I will provide videos of lectures for that week, in addition to lecture notes. Homework will be collected and assigned as usual.

Course Description: This course is an introduction to the microscopic physical description of Nature. Quantum mechanics is an entirely novel framework in which to view the world in contrast to classical mechanics, and this class introduces formalism, principles, and examples which underly almost all of contemporary physics and much of modern technology.

Course Requirements: There will be three graded aspects of this course: weekly homework problems, a final project, and an oral exam. In calculating your final grade, your one lowest homework score will be dropped.

Homework: Homework will consist of problems taken from the recommended textbook or originally created by me, and will develop methods discussed in lecture. Homework should be written by hand (with pen/pencil and paper) or typed up and is assigned through the course website during the week of classes on that topic. Homework is due in class the Friday of the following week. Late homework will not be accepted.

Final Project: An important part of science is the ability to efficiently communicate in writing. There will be a final project for this course in which students will study a topic relevant to quantum mechanics in more detail. A list of possible projects will be presented after spring break, or students can suggest their own topic, with my approval. Students will then write a 5-page, *Physical Review*–style paper on the topic, with appropriate references. More details will be provided throughout the semester.

Oral Exam: Another important part of science is the ability to efficiently verbally communicate. In addition to the final project, there will also be an individual oral exam in which you will discuss aspects of quantum mechanics one-on-one with me. You will sign up for a 30 minute slot during finals week.

Grading: The amounts to which the homework, final exam, and oral exam contributes to your grade are:

Homework	50%
Final Project	30%
Oral Exam	20%

Weekly Lecture Topics: Following is a list of topics we'll discuss this semester during each week. This isn't a final schedule, and may possibly change as the semester goes on.

Week:	Date:	Topic:
1	1/27	Linear Operators
2	2/3	States, Observables, and the Hilbert Space
3	2/10	Probability and the Wavefunction
4	2/17	Axioms of Quantum Mechanics and the Schrödinger Equation
5	2/24	Infinite Square Well
6	3/2	Harmonic Oscillator
7	3/9	Free Particle, Scattering, and Bound States
8	3/16	Angular Momentum and Spin
	3/23	**Spring Break**
9	3/30	Quantum Numbers and Spin-Statistics
10	4/6	Central Potentials and the Hydrogen Atom
11	4/13	Perturbative Methods
12	4/20	The Path Integral
13	4/27	The Density Matrix and Entropy