PHYS 631: Quantum Mechanics I (Fall 2019)

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Course home page:

http://atomoptics-nas.uoregon.edu/~dsteck/teaching/19fall/phys631

Schedule: TTh 10-11:50a, 318 Willamette
Course reference number: 15117
Credits: 4
Prerequisites: none

Links: news, course notes, homework sets and keys.

Course overview

This course is a more-or-less standard introduction to quantum mechanics at the graduate level, one of the core components of your Ph.D. studies. This is the first of a 3-quarter sequence. This course will also assume you have studied quantum mechanics for at least one term at the undergraduate level.

Recommended Texts:

There is no required textbook to purchase for this course. The main reference for this course will be online notes posted here.

Much of this material is also covered well in many excellent texts. A few of the more widely used and/or interesting ones that you may want to have in your collection are:
Grades

Grades for the course will be based on homework, a midterm exam, and a final exam. The relative weights will be as follows:

- Homework: 30%
- Midterm exam: 30%
- Final exam: 40%

Homework: about 6-8 problem sets will be assigned during the term.

Midterm exam: The midterm exam will be held in class on Tuesday, 5 November 2019 (during the sixth week of class).

Final exam: The final exam is scheduled for Monday, December 9, 8-10a (!), in 318 Willamette.

Pass/fail grading option: Since this is a core graduate course, you should take the graded option.

Syllabus

This is a tentative list of topics we will cover during this term. (I may change things up and throw in some other topics.)

1. Overview of mechanics in Hilbert space
2. Operators and expectation values; Uncertainty principle
3. Matrix mechanics, unitary transformations, time evolution
4. Free particle
5. Square-well potentials
6. Probability currents and tunneling
7. Delta-function potential
8. Double-well potentials, two-state dynamics, quantum Zeno effect
9. Harmonic oscillator
10.