PHYS 631
Quantum Mechanics

Fall Quarter 2009

MWF at 13:00 at 318 Willamette.

This the first quarter of a one year graduate level course. It is for students who have had an introductory course in quantum mechanics before. Students should also have a good background in mathematics, including linear algebra and complex analysis. I will start from the beginning and develop the major ideas of quantum mechanics. Thus a student who has not seen some particular idea or method will be able to learn it in this course. However, the pace will be too fast for a student who has not seen any of the ideas and methods.

Instructor:

- Davison Soper
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- office: 479 Willamette.
- office hours: Tuesdays and Thursdays 11:00-12:00.

Text:


Schedule:

- I will be out of town on Monday 26 October to present a seminar for undergraduates at Humboldt State University in California. We will need to reschedule that class.
- I will be out of town on Friday 20 November for a meeting at Northwestern University of CTEQ, a research group that I belong to. We will need to reschedule that class.

Reading:

- 5 - 9 Oct: Sakurai, Secs. 1.5. Notes, Vectors for quantum mechanics, Secs. 5 - 10.
- 12 - 16 Oct: Sakurai, Secs. 1.6 and 1.7. See also the notes on Choice of units for quantum mechanics and on Position and momentum in quantum mechanics.
Homework:

There will be problems assigned each week in class, due on Wednesday. Occasionally a problem will involve computer work. I recommend Mathematica, which is available at UO computer labs. If you already know some other computer language like C++, Fortran, Matlab, or Maple, you can use what you know.

1. Wednesday 7 October. Exercises 1.1, 1.2, and 1.3 in the notes *Vectors for quantum mechanics*.
2. Wednesday 14 October. Exercise 1.4 and 1.5 in the notes *Vectors for quantum mechanics*. Sakurai, problems 1.1 and 1.13. See solution comments.
3. Wednesday 21 October. Sakurai, problems 1.19, 1.23, 1.29.

Available notes in .pdf and .nb format:

- *Vectors for quantum mechanics* (12 October 2009).
- *Choice of units for quantum mechanics* (16 October 2009).
- *Position and momentum in quantum mechanics* (19 October 2009).

Exams:

- Midterm Exam: 13:00 Wednesday 28 October.
- Final Exam: 15:15 Tuesday 8 December.

Grading:

The homework assignments will count for 25% of the course grade. There will be one midterm exam, which counts for 25% of the course grade. The final exam will count for 50% of the course grade.

Exams are to be taken without notes or books. That is because I want to encourage you to remember the most important formulas for quantum mechanics. If you will need an obscure complicated formula for an exam question, I will give it on the exam.

Note: I encourage students to work together on the homework. I don't want you to just copy from someone else's work because you won't learn anything that way, but if you work out the solution jointly with someone else or with a group, that's fine. Real science usually involves teamwork, so it's a good idea for you to learn how to work on science with others. This policy is an exception to the normal university rule about doing your own work. Of course, on exams, your paper has to be entirely your own work.

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