Course Syllabus

PHYS 631: Quantum Mechanics

Willamette 318
TTh 10-11:50 AM

Fall 2017
Instructor: Spencer Chang

Office: Willamette Hall 462

Office Hours: In office (W 5-6pm, F 10-11am) or by appointment. Feel free to come chat about the course, my research, or anything that interests you.

E-mail: chang2@uoregon.edu (mailto:chang2@uoregon.edu)

Teaching Assistants: Mostafa El Demery

Course Description

This course is the first quarter of a three quarter sequence in graduate level quantum mechanics. As a prerequisite, you are expected to have completed an undergraduate quantum mechanics course at the level of “Introduction to Quantum Mechanics” by Griffiths and should have familiarity with solving differential equations, using the postulates of quantum mechanics, and analyzing simple quantum mechanical systems (e.g. particle in a box, harmonic oscillator, hydrogen atom). Many of these topics will be reviewed, but the aim is to cover the topics at a more advanced level, preparing you for future research into quantum mechanics.

Learning Outcomes

Through this course, students will learn:

- How to use vector spaces and operators to represent quantum mechanical states and measurements
- The postulates of quantum mechanics and some of their experimental implications/confirmations
- How quantum mechanics reduces to the classical limit through the path integral
- How to derive the uncertainty principle
- How to analyze a few classic 1-dimensional problems (incl. particle in a box, simple harmonic oscillator)
- How to utilize symmetries in quantum mechanical problem

Text and other Course Requirements
The textbook for this course is “Principle of Quantum Mechanics” 2nd edition by R. Shankar. I also suggest “Modern Quantum Mechanics” by J. Sakurai and the first chapter on the history of quantum mechanics in “Lectures on Quantum Mechanics” by S. Weinberg.

Workload and Grading Policy

There will be homework assignments offered roughly weekly, with about eight total, including one during dead week (the last week of class). These will comprise 50% of your grade with the lowest one being dropped. Please let me know as soon as possible about any issues with turning in a homework on time. Late homework will not be accepted without prior arrangement. In addition, there is an in class midterm, worth 20% of your grade, and a take home final, which is worth 30% of your grade. Your ultimate grade will be based on this composite score and I reserve the right to curve up the grades if needed to generate a reasonable distribution, as well as the ability to improve your final grade to take into account improvement over the course (e.g. going from a B to a B+). Total work expected in a week will be about 2-3 hours of reading, 3-4 hours on the homework, and 3-4 hours of lecture.

Course schedule and assignments

We will cover roughly 1 chapter a week, see canvas course calendar pages for specific information on topics covered. Class will be primarily lecture based, but questions and discussion are highly encouraged. On average there will be about 75-85 minutes for each lecture, but occasionally we might use the full two hours (with a break) to make up or catch up. There is no class on November 23rd (Thanksgiving).

Collaboration Policy

Discussion with classmates on homework is encouraged (whereas the final is to be completed alone). However, students must submit their own work. The homework is essential to mastering the subject, thus it is more important to understand the methods than the final answers. Academic misconduct will not be tolerated. Please see the University Student Conduct Code (http://conduct.uoregon.edu (http://conduct.uoregon.edu) ) for more information.

Electronics Policy

Humans are terrible multi-taskers and thus, I encourage everybody to limit the use of technology in class to note taking and recording of lectures. Be aware of the distractions other uses have on your attention and those around you.

Students with Disabilities

Please arrange a meeting with me to discuss any aspects of the course which are barriers to your inclusion. All shared information will be kept confidential.

Course Summary:

<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tue Sep 26, 2017</td>
<td><a href="https://canvas.uoregon.edu/calendar?event_id=70384&amp;include_contexts=course_94009">PHYS 631- Introduction and Vector Spaces</a></td>
<td>10am to 11:50am</td>
</tr>
<tr>
<td>Thu Sep 28, 2017</td>
<td><a href="https://canvas.uoregon.edu/calendar?event_id=70381&amp;include_contexts=course_94009">PHYS 631- Dirac Notation</a></td>
<td>10am to 11:50am</td>
</tr>
</tbody>
</table>