Course home page: [http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633](http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633)

Schedule: MT 5-6:50p  
Course reference number: [33035](http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633)  
Credits: 4  
Prerequisite: PHYS 632

Links: [news](http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633), [readings/notes](http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633), [homework sets and keys](http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633).

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**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 third of a 3-quarter sequence.

**Text:**

You don't need to purchase a textbook for this course. The main reference for this course will be online notes posted [here](http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633). You will also receive specially formatted daily versions of the relevant notes.

**Philosophy of This Course:**

By this point, you have already survived two terms of quantum mechanics at the graduate level. Good work! I intend for this third term to be a little different, more of a *transitional* course between core and advanced graduate physics courses. This means: less focus on you proving that you can handle graduate-level material; less formality in exams than in previous terms; more advanced material; and solving more sophisticated problems.

In particular, unlike previous terms, there will be no midterm exam; most of your graded work this term is homework, and working through notes (more on this below). There will be an *oral* final exam.

**Special Considerations:**

The [COVID-19 pandemic](http://atomoptics.uoregon.edu/~dsteck/teaching/22spring/phys633) continues, although it seems to be settling down somewhat as of the beginning of this term. Nevertheless, some members of class have expressed concerns about in-person meetings, so while masks are not required, they will be greatly appreciated.
Grades

Again, the intent is for this to be a transitional class between core and advanced graduate courses, and as such will be less formal in terms of evaluation. Grades for the course will be based on completing the reading assignments, homework problems, and a final exam (no midterm). The relative weights will be as follows:

- Exercises: 10%
- Homework: 45%
- Final exam: 45%

Exercises: As in previous terms, these are relatively simple (compared to homework problems) related to the lecture material. These will be assigned during each lecture, when you'll start working on them, and they'll be posted on the notes page. You should turn in (online, see the notes page) your exercise solutions for each week all together, by the following Tuesday. I'll grade these on completion (i.e., if you do a reasonable job, you'll get full credit).

Homework: will be assigned every two weeks. (Thus there will be five total homework assignments.)

Final exam: The final exam will be an oral exam. These will be scheduled individually during finals week or the last week of class (as convenient for you, to avoid conflicts with other exams). Details remain to be worked out, but Zoom will be involved.

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 this term. Note that the topics listed are too much to go through in one term.

1. Hydrogen atom (overview)
2. Resolvent operator
3. Time-independent perturbation theory (continuation and applications)
4. Time-dependent perturbation theory
5. Fermi Golden rule, decaying quantum systems
6. Path-integral quantization
7. Dissipation in quantum mechanics (?)
8. Scattering theory (?)
9. Second quantization (?)
10. Relativistic quantum mechanics (?)
11. Constrained quantization (?)