

PHYSICS 3650
Quantum Physics I
Fall 2021

Instructor: Peter Arnold (parnold@virginia.edu)

Grader: Mohit Srivastav (mvs2dq@virginia.edu)

TEXT: John S. Townsend, *A Modern Approach to Quantum Mechanics* (2nd edition), published by University Science Books. [Warning: Townsend has another book with a vaguely similar title, so make sure you get the right one.]

Office hours: TBA (pester me if I haven't announced them by the end of the first class!) I'm usually available for quick questions after class.

Lecture: 11:00 - 11:50 p.m. MWF, Physics Building, Rm. 203

Phone: 924-6813; e-mail: parnold@virginia.edu

Grade weighting

- 35% Final Exam: **Friday, December 17, 9:00-12:00**¹
- 15% 1st Midterm Exam: Friday, September 24, in class
- 15% 2nd Midterm Exam: Friday, October 29, in class
- 35% Homework

Topics covered: Roughly chapters 1–7 of Townsend, with some additions and some omissions, plus Chapter 8 time permitting. To get the full content of the course, you will need to attend lecture *and* read all of chapters 1–7 of Townsend. Sometimes the lectures closely follow the development in the book and many times they do not.

Missed Lecture due to illness or quarantine: Please e-mail me if you have missed (or know you will miss) lectures due to illness or quarantine. I should be able to make arrangements to help with that. Also, let me know if you have an unusual academic commitment (like a conference you are attending).

Lecture Notes: I do not normally provide copies of my personal lecture notes. However, see above for missed lectures due to illness or quarantine.

Reading: You are responsible for all material in Chapters 1–7 of Townsend (and 8 if there's time to cover it), unless explicitly told otherwise via class-wide email. If you remind me, I will try to keep an updated list available in Collab (file "reading.pdf" under Resources) of sections of Townsend of particular relevance to particular lectures.

Homework: Submission format to be decided. Late homework will generally be assessed a penalty, which will grow as time increases. (But if you know in advance that you have some scheduling problem or an unusual burden that particular week, just talk to me in advance about the possibility of an extension.)

Collaboration on Homework: Collaborating with your classmates on working out methods of solution is actively encouraged! However, you must write up your solutions on your own—copying someone else's paper is unacceptable. The same is true if at any point you look at a solution on the internet or in a book (see my passionate discouragement below!). When you are finally writing up your own solution, you may not have someone else's solution in front of you.

Many of the non-Townsend problems that I assign will be ones that I have assigned in previous years—***do not seek out copies of past solutions***. I would consider doing so a clear violation of the honor code.

¹ Please double check final exam date against official UVa sources (e.g. google "uva examination schedule" or look on SIS).

As to the internet, I am sure you can find solutions to problems from Townsend somewhere. I strongly, strongly, *strongly* discourage you from looking for solutions except as a *very last* result, after hours of struggle. And, even then, I strongly recommend asking your classmates and me for help before turning to the internet. You will not learn anything if, to save time in what I know are busy schedules, you make the internet your source for solving problems. No pain, no gain.

A pen suggestion: When doing your homework or other assignments, if you'd like something that shows up on a scan as well as pen but is erasable like pencil, you could consider trying my personal favorite, which is Pilot Frixion pens. (This is strictly optional — use whatever works for you!)

Warning: if you put your paper on a hot air outlet or leave it in a hot car, the Frixion ink will turn invisible and stay that way if it gets very hot (145 degrees F?). Conversely, every erasure (which work from the heat of rubbing the pen's "eraser" end on the paper) will become visible again and stay that way if it gets cold enough (0 degrees F?). If your notes get too hot and turn invisible, you can fix it by putting them in a cold freezer, but at the cost of being stuck with everything you ever erased also becoming visible. Another warning: It seems to me that the ink runs out faster in these pens than other types of pens.

Attendance and Responsibilities: You are responsible for announcements made in class (as well as those made by email). You are responsible for the material presented in class (some of which is not in the textbook), all material from the textbook (unless explicitly told otherwise), and turning in your homework on time. Other than that, I do not penalize for lack of attendance, but I think it's a really bad mistake not to come to most every class (as well as a bad mistake not to also carefully read the book). QM is subtle, and you need as much exposure to, and even repetition of, the concepts as possible.

Course Grades: Here is a rough description of how I grade my courses.

My grading is roughly curved (as described below) but not precisely so — that is, I do not have exact predetermined percentages of A's, B+'s, etc. that I plan to give.

Also, grades below C- are handled separately. At the end of the semester, I have in hand your final exam. If you are in danger of getting a D or F, I look at that to help me make a curving-independent judgment about whether I think what you've learned merits either of those grades.

As to the rest: At the end of the semester, I add up each person's points to get a total course score. Then I plot (for just myself) a distribution of those total scores. I first look for natural breaks in the distribution to draw tentative boundaries between letter grades. If there are no natural breaks (and even if there are), I look at final exam scores. If someone who did particularly well on the final is near a grade threshold, I will consider moving my original line down slightly to catch them. But the letter grades will be monotonic: someone with a lower total score will not get a higher grade than someone with a higher total score.

Finally, a weasel legal disclaimer: I do not 100% unbreakably promise that the grading method described above is exactly what I will do. But it's what I've done in the past and what I am currently planning to do.

Honor Code: Though I do what I can to minimize the possibility of and temptation for cheating, please keep in mind that students themselves have the ultimate responsibility for upholding the honor code and reporting honor offenses. Let me hopefully put everyone's mind at ease by saying that based on many years of teaching 3xxx-level Physics courses, I do not believe there has been any significant level of cheating in those courses (even during the pandemic).² I rely on all of you to uphold that standard.

Mental Health and Well-being: If you are feeling overwhelmed, stressed, or isolated, there are many individuals here to help. The Student Health and Wellness Center offers Counseling and Psychological Services (CAPS) for its students; call 434-243-5150 to speak with an on-call counselor and/or schedule an

² If you think I am naive about 3xxx-level Physics courses, feel free to send me a private email (or, if you don't wish to identify yourself, use the Anonymous Feedback feature in Collab).

appointment. If you prefer to speak anonymously, you can call Madison Houses HELP Line at any hour of any day: 434-295-TALK. Alternatively, you can call or text the Disaster Distress Helpline (1-800-985-5990, or text TalkWithUs to 66746) to connect with a trained crisis counselor; this is toll free, multilingual, and confidential, available to all residents in the US and its territories.