Quantum Mechanics, continued (Physics 212C)
Spring 2023

Course times and locations: For times of lectures and office hours please see the course webpage.

Use of the Web: The course web page is

http://physics.ucsd.edu/~mcgreevy/s23/ .

Problem sets, solutions, lecture notes, handouts, announcements, *etc* will be distributed via this page. You should check it regularly (*e.g.* before each lecture) for new material. It will help to look at the relevant lecture notes before the lecture happens. Problem sets will be collected and graded via Canvas.

Content: My rough plan is to focus on quantum mechanics of many particles, so 'second quantization', the radiation field, interactions between light and matter, and some discussion of atoms and molecules. We will also talk about about interacting many-body systems.

Texts: I do not plan to follow any textbook very closely. My posted lecture notes will be the main text.

I will sometimes refer you to some relevant sections of the following books:

Lectures on Quantum Mechanics by G. Baym.

Quantum Mechanics: An Experimentalist's Approach by Eugene Commins.

Advanced Quantum Mechanics by J. J. Sakurai.

Quantum Physics by M. Le Bellac.

Grading:
Grades will be determined by problem sets, class participation, and take-home final.

Problem sets:

Problem sets are a very important part of this course. Sitting down yourself and trying to reason your way through a problem not only helps you learn the material deeply, but also develops analytical tools fundamental to a successful career in science. I recognize that students also learn a great deal from talking to and working with each other. I encourage each student to make his/her own attempt on every problem and then, having done so, to discuss the problems with one another and collaborate on understanding them more fully. Such collaboration adds most to the understanding of those participants who have done the most by themselves first. The solutions you write up after any discussion and then submit must reflect your own work. They must not be transcriptions or reproductions of other people's work.

In doing the problems, you should feel free to use whatever computational software (*e.g. Mathematica*) you find useful; please make a note in your write-up when you do so.

Problem sets will be posted on the course web page. They will generally be due at the beginning of lecture.

Homework hand-in procedure:

- Homework will be handed in electronically. Please try to avoid handing in low-quality photographs of hand-written work. The preferred option is to typeset your homework. It is easy to do and you need to do it anyway as a practicing scientist. A LaTeX template file with some relevant examples is provided here. If you need help getting set up or have any other questions please email me.

- To hand in your homework, please submit a pdf file through the course's canvas website, (at canvas.ucsd.edu) under the appropriate assignment, hwnm (where nm are the decimal digits of the assignment number).

Thanks in advance for following these guidelines. Please ask me if you have any trouble.

Miscellaneous unsolicited advice about how to do well in this class:

Participate in lecture! I will post my lecture notes, but they are intended as a supplement to what is presented in lecture, not a substitute.

Keep up with the material. Review the lecture notes from previous lectures before the next one. The structure of this course is a bit of an experiment, and I am relying on all of you to follow its twists and turns. I will post the relevant reading assignments in advance; read ahead.

Start the homework problems as early as possible. Give yourself some time to think about them, and keep them in mind when you are reading and in lecture.

Ask lots of questions (during lecture, by email, during office hours). The fact that you can ask questions is the point of having classes and not just having everyone go learn on their own.