Quantum Mechanics (Phys 580)
Syllabus

Taner Edis

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1 How to Find Me

The best way to reach me is e-mail, *edis@truman.edu*. My office phone is 785–4583, but I don't check messages often.

My office is MG 3004, and my office hours are: Tuesdays and Thursdays: 14:00–16:20, Wednesdays: 14:00–15:20. Check my calendar to see when might be best (*edis.sites.truman.edu/schedule/*).

I will be using the web to post course-related notices and documents, especially homework solutions. Bookmark the Quantum Mechanics home page: *edis.sites.truman.edu/quantum-mechanics/*.

2 Course Description

This is an introduction to quantum mechanics, covering the basic mathematical apparatus, going on to solve basic 1D problems, the harmonic oscillator, barriers and tunneling, and the hydrogen atom.

There will be *a lot* of mathematical formalism involved. I will assume you already have a solid background in Mathematical Methods (Phys 382), including PDEs (particularly the wave equation), complex numbers, and Fourier analysis. You will also benefit from experience with Linear Algebra, particularly eigenvalue problems. For basic physical background and motivation, I will assume you remember what you learned in your Modern Physics sequence. Finally, I will also on occasion call on concepts that should be familiar to you from Classical Mechanics, such as Hamiltonians.

This is one of the more advanced courses you will take in your undergraduate career. Perhaps more so than with what you have taken before, just getting the hang of solving some typical problems will not be enough. You will need to *read* your textbook carefully, and work through the math as you go along. Unfortunately, human brains are not quite built for quantum mechanics; it can be very difficult to get an intuitive physical picture of what's going on. You will not get far with quantum mechanics unless you get the hang of the mathematics.

3   Schedule

Class: Tuesday and Thursday 9:00–10:20, MG 3000.
　　　　Wednesday 9:30–10:20, MG 3000.

I will not set aside a fixed hour as a recitation; we'll do them as they come.

4   Course materials

Your textbook will be David H. McIntyre, *Quantum Mechanics.* I am not going to follow every detail—I picked it as a textbook so that you can see a slightly different approach than what I will present in lectures. Between me and the book I hope you will find something that will work for you.

Depending on our pace, we should have about two weeks toward the end of the semester to play with some more advanced topics of your choice. If you prefer an introduction to condensed matter and many-body quantum mechanics, we will use some of the related material in the book, plus I will give you some outside information in class. If you prefer an introduction to relativistic quantum mechanics, we will have to go entirely outside the book.

5   Homework and Recitations

Homework is *important.* It will determine 25% of your final grade.

I will announce an upcoming set of homework problems approximately every week, and tell you the due date.

I do not mind you discussing the homework with one another as well as with me. I will give hints if you come by my office and ask. However, I

expect you to turn in the results of your own efforts—not group solutions, and certainly not solutions directly taken from someone else. If I find homeworks too similar to each other, especially if they make the same mistakes, you will have some explaining to do.

I care about maintaining academic integrity, and I will apply all Truman policies. See *studentinvolvement.truman.edu/handbook/conduct.html* for the Student Conduct Code.

Before each homework set is due, we will also solve a couple of recitation problems in class. I won't grade you on the recitations, though I will ask you to come up and solve them before the class. You don't have to get them right, and getting stuck is fine—I'll be there to help. The idea is to have me see you how you approach these things and help set you on the right path.

Chapter	Homework	Recitation
1.	1, 11, 15	12, 14
2.	7, 9, 17, 23	6, 12
3.	2, 6, 9, 14	8, 12
5.	2, 5, 8, 17	9, 20
6.	2ii, 4, 26, 29	2i, 25
7.	15, 26, 29, 11.4	16, 23
8.	7, 8, 11, 13	6, 9
9.	6, 9, 16, 22	11, 15
10.	10, 18, 24	17, 23
13.	3, 8, 11	7, 12

6   Exams

The default option is three take-home exams with somewhat lengthy questions, each determining 25% of your final grade. If you prefer another arrangement, ask in class.

I expect you to work on all exams strictly alone, without *any* discussion with others inside and outside of class. Do not use online resources such as web sites and discussion groups to give you hints or solutions.

7   Final grades

As with every other aspect of the course, I intend to be flexible. If you get less than 50% in your overall grade, you will certainly fail, and 90% or better will certainly be an A, but otherwise, I don't want to declare rigid boundaries such as "65%–77% is a C" and so forth.

If you want to know how you are doing, or what sort of performance on the final you would need for an A, or have similar grade-related concerns, just stop by my office and ask. I should be able to give you a fair estimate of where you stand.

8   Make-Ups

It is very hard to arrange for make-ups for exams or homework in a course like this. So I expect you will do everything possible to turn your work in on time, and so avoid later hassle for both me and yourself. I post solutions on the course web site; once they are up, it's too late to hand that work in.

Nevertheless, you may find you have missed something because of a legitimate excuse like being badly sick or having a death in your family. In this case, come and speak with me, and I will decide, on a case-by-case basis, how to make up what you have missed. I will typically assign you some appropriate extra work, have you take a make-up exam in my office, or something similar.