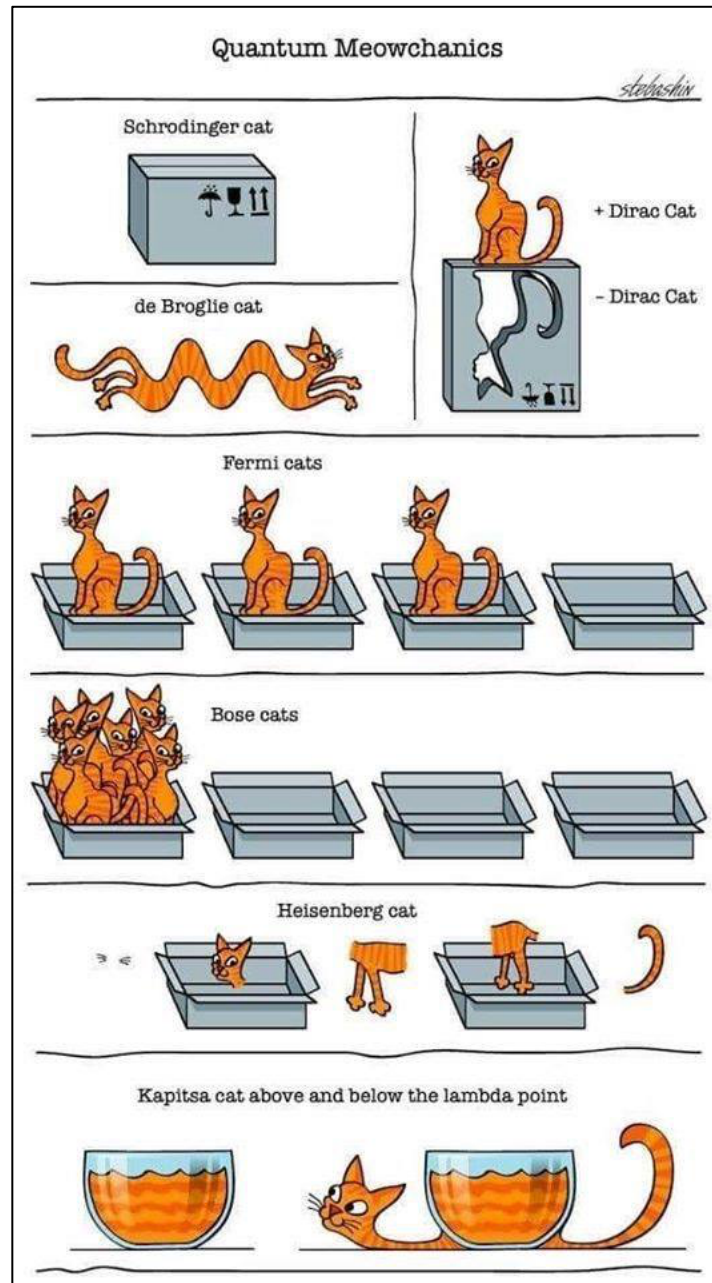


PHYS 4702/6702: Quantum Mechanics II Syllabus

University of Georgia, Spring 2021
MWF Period 4 (11:30-12:20 PM), Room 327



“I think I can safely say that nobody understands quantum mechanics.”

— Richard Feynman

“Maybe so, but we’re going to do our darnedest anyway!”

— Steven Lewis

Basic Information

Instructor:	Professor Steven P. Lewis 307A Physics Building	Phone: 706-372-0971 (cell) Email: spLewis@uga.edu
Office hours:	Via Zoom: TBD; In-person: By appointment.	
Clinic:	I'm still working out a way to make clinic work. Stay tuned!	
Textbook:	<i>Quantum Mechanics: A Paradigms Approach, 1st Edition</i> , by David H. McIntyre, with Corinne A. Minogue and Janet Tate, (Pearson, 2012).	
Optional Texts:	<i>Introduction to Quantum Mechanics, 3rd Edition</i> , by David J. Griffiths and Darrell F. Schroeter, (Cambridge, 2018). <i>The Feynman Lectures on Physics, Vol. 3</i> , by Richard P. Feynman, Robert B. Leighton, and Matthew Sands, (Cal Tech, 1963). A free electronic version is available at http://feynmanlectures.caltech.edu/info/ .	
Website:	Homework, lectures, handouts, grades, and other information will be distributed via eLearning Commons (elc.uga.edu).	
Prerequisites:	PHYS 4701/6701 (Quantum Mechanics I).	
Email:	You are expected to check your email <i>daily</i> for course announcements.	

Grading Policy

Grade components: At the end of the semester, I will compute an overall score from your performance on exams and homework, weighted as follows:

- Exam I: 35%
- Exam II: 35%
- Homework average: 30%

Letter grades: Ranges for letter grades will be *no worse for you* than the following:

A+ [Nonexistent]	B+ = [83-85)	C+ = [73-75)	D± [Nonexistent]
A = [87-100]	B = [77-83)	C = [67-73)	D = [50-65)
A- = [85-87)	B- = [75-77)	C- = [65-67)	F = [0-50)

Here a square bracket means the end point is included in the range, and a round bracket (parenthesis) means the end point is not included in the range. Actual grade ranges may end up having lower cutoffs, depending on the overall level of performance.

Regrade requests: Any requests for a regrade of an assignment or an exam must be made *no later than one week after the item is returned*. Any regrade requests made after this one-week window will be declined without further review. Keep in mind that a regrade may end up raising *or* lowering your score. Correcting arithmetic errors made in totaling up points does not count as a regrade and is not subject to the above time limitations.

Borderline grades: Like any other measurement, grades possess a degree of uncertainty. Therefore, factors such as improvement *may* help borderline grades. (Lobbying, however, will not!) There is no extra credit in this course, so please don't ask.

Withdrawals/Incompletes: The [Undergraduate Bulletin](#) and the website of the [Office of the Registrar](#) describe University policies regarding withdrawals and incompletes. Make sure you are familiar with them. The withdrawal deadline is **Monday, October 25**. Any student showing serious neglect for this course (e.g., routinely failing to turn in homework, etc.) may be asked to withdraw. Any student failing to turn in 2 consecutive homework assignments, without adequate prior explanation, will be considered eligible for an instructor-initiated withdrawal from the course.

If you are considering withdrawing from the course, you should discuss your choice with me beforehand. In many cases, students are doing better in the course than they think.

A grade of Incomplete is intended for a student who has completed a substantial part of the course, but, for non-academic reasons beyond their control, was unable to complete all of the course. An Incomplete is not appropriate for a student who has missed a large portion of the course assessments, regardless of the reason. Nor is an Incomplete appropriate for a student who is unhappy with their performance in the course and wants to avoid getting a low grade. In both of these cases, withdrawal from the course is the appropriate action.

The Ongoing Pandemic and How It Will Affect This Class

We have been told that classes are to return to normal, in-person instruction this semester, despite the recent upsurge of COVID due to the delta variant. We have also been told that we may not require that students and faculty be vaccinated and/or masked in class. Even more severely, we *may not even ask* students, colleagues, visitors, etc. if they have been vaccinated! This strikes me as needlessly restrictive. My only guess is that those making these decisions do not believe in data and medical science and public-health best practices and instead believe that “crossing their fingers” and wishing the pandemic over will be enough to get full compliance. Well, this is who we have leading us and deciding for us today. I fervently hope that your generation will do better when you all are in charge.

For my part, I am happy to volunteer the fact that I am fully vaccinated (Moderna) against COVID, and I will continue to wear a mask when indoors (except in my office) and/or in close proximity to others. I consider that the only decent and responsible thing to do. I am not permitted to require these sensible “best practices” of you; however, I do urge you strongly (a) to get vaccinated, barring a valid medical reason (e.g., a compromised immune system), and (b) to wear a mask when near other people (e.g., in class). Yes, masks can be annoying and uncomfortable, but public-health experts universally agree that it's a good, low-stakes way to greatly decrease the likelihood of spreading this horrible disease to others.

Finally, I will do my best to limit exposure by holding office hours exclusively online via Zoom. If you wish to meet with me in person for some reason, you are welcome to make an appointment. Also, homework and exams will be submitted, graded, and returned to electronically (see below), to minimize possible hand-to-hand transmission.

Exams

Number and rules: There will be two exams: Exam I (midterm) and II (final). The midterm exam will be on material from the first half of the course, and the final exam will be on material from the second half. There will *not* be a comprehensive final exam this semester. Both exams will be done at home. You will be permitted to consult the following resources only: the class textbook (McIntyre), your own class notes, any information I provide you on the class eLC site, and me. You may *not* consult *any other* books, websites, or people. You may use a scientific calculator on exams *for arithmetic only*, not algebra, calculus, graphing, or information storage. Unless told otherwise, you must show work on each exam problem in order to receive full credit. Partial credit is awarded (based on your work) for incomplete or incorrect answers, so it is in your best interest to attempt every problem.

Dates and Timing: You will be given ample time to complete the exam, but not infinite. You will be expected to upload your completed exam to the proper location on eLC by a particular time (to be given later). Exams submitted past deadline will not be graded, unless you have *prior* authorization from me to submit it late. The specific date and time of the midterm has not yet been determined. The final exam will be on **Wednesday, December 14, Noon-3:00 PM**. I will give further information on each exam before the exam date.

Missed exams: If you need to miss an exam for a *legitimate and documentable* reason, you must contact me before the exam if at all possible, or else as soon as possible after the exam. Arrangements for dealing with missed exams will be made *only* for cases involving legitimate, documentable reasons and *only* if you notify me in a timely fashion. Do not presume that your situation or documentation merits an excused absence; that determination is not your prerogative. Instead ask me. *Unexcused exam absences will result in a grade of zero.*

Homework

Logistics: There will be 7–9 problem sets. Problem sets will be delivered to you via eLC. You will complete the problem set either by hand on paper or by typesetting program (e.g., Word or LaTeX) on a computer, and then submit it on eLC in the appropriate location in PDF format. Physical hardcopies will *not* be accepted! Each problem set will be due by 11:00 PM on the due date given on the assignment sheet, unless otherwise stated. The pace of the class and changes to the schedule may necessitate changes to the due dates, which will be announced by email (and probably on eLC). Detailed homework solutions will be posted to eLC after the homework is due.

Grading: Problem sets will be graded by a graduate student assigned as the grader for this course (I will grade exams) and returned to you in a timely fashion. Disputes about the grading should be directed to me, and I will act as the final arbiter. Homework problems will be graded not only for correctness of the end result, but also on process. Be sure to express, clearly and legibly, the reasoning for your solutions. Rule of thumb: If the person grading can't read it or follow your argument, then it's wrong.

Dropping lowest score: If you complete the online student evaluation for this course during the official period at the end of the semester when the evaluations website is up, then I will drop your lowest homework score when calculating your homework average for semester

grades. If not, then all homework scores will be included in your homework average. This policy serves two functions: (a) it gives you an incentive to submit a course evaluation, and (b) it compensates for unavoidable circumstances that may prevent you from submitting homework on time (*e.g.*, illness, scheduled event, emergency, etc.).

Late problem sets: If you have a good reason for wanting an extension, ask me for it (in advance!), and I will probably give it, provided you don't abuse the privilege. *However, late problem sets will not be accepted or excused without prior approval.*

Teamwork vs. plagiarism: Teamwork can be a very good way of learning; so I encourage you to interact with your classmates on homework. However, do not mistake teamwork for plagiarism. It is unacceptable, for example, to divvy up the problems and then swap solutions. The work you hand in *must be your own*, not copied, reworded, or paraphrased from someone else's work. I will choose problems from a variety of sources, including my own imagination. It is likely that solutions for many of the assigned problems can be found on the internet or other sources. I know this, and now you do too. It is unacceptable for you to solve homework problems by "mining" for existing solutions. Nor is it acceptable to consult existing solutions for hints. Both of these constitute forms of plagiarism. Remember, the only way you will learn the subject is by sweating through problems on your own and/or with your study team.

Final comment: Working physics problems is *by far* the best way to learn physics, so it is important that you make every effort to do an honest and thorough job.

Graduate/Honors Credit

Who: Graduate students in this course are enrolled in PHYS 6702. Undergraduates in the Honors Program wishing to receive honors credit for this course must transfer into PHYS 6702. (See your undergraduate major advisor.)

What: Students enrolled in PHYS 6702 will have an additional term project. I will communicate the details of this term project at a later time in a separate document.

Effect on grade: Your preliminary semester letter grade will be determined according to the section "Grading Policy" above and then (possibly) adjusted based on your performance on the term project. The purpose of the term project is to warrant graduate or honors credit for this course, distinguishing it from 4702. It is *not* designed to give 6702 students an opportunity for extra credit (or extra penalty) that the 4702 students don't have. Therefore, in most cases a satisfactorily completed term project will not change your final letter grade from the preliminary letter grade. However, a truly outstanding term project will be rewarded with a one-step increase in your letter grade (*e.g.*, B becomes B+, B+ becomes A-, A becomes A with a special gift from me). Similarly, a very poor term project will be penalized with a one-step decrease in your letter grade (*e.g.*, A- becomes B+, B+ becomes B, etc.). Finally, if you fail to submit the term project by the deadline, then your final grade will be two steps lower than your preliminary grade (*e.g.*, A- becomes B, B+ becomes B-, etc.) Specification of what "truly outstanding", "very poor", and "deadline" mean for this term project will be addressed in the document describing the term project.

Academic Honesty

The University of Georgia has a comprehensive policy on academic honesty known as *A Culture of Honesty*. This policy not only describes required and prohibited conduct, as pertains to academic honesty, but also provides a detailed procedure for resolving matters of alleged academic dishonesty, including a description of consequences for honesty violations. The complete policy can be found online at <http://www.uga.edu/honesty/>. All students are responsible for knowing, understanding, and abiding by this policy. If you have any questions about the appropriateness of your work in this course, you are obligated to ask me for clarification.

I take issues of academic honesty very seriously, and it is my responsibility to uphold the University's policy. This means, among other things, that I will not hesitate to report my suspicions of dishonesty (e.g., plagiarism, unauthorized assistance, etc.) to the Office of the Vice President for Instruction. This extends not only to exams but also to homework and (for PHYS 6702 students) term projects.

Disability Accommodations

I will make every reasonable effort to accommodate students with documented disabilities. Students requesting accommodations must provide documentation from the Disability Resource Center in a timely fashion.

Student Distress and Mental Health

If your course performance is significantly affected by issues beyond your control, I urge you both to let me know and to seek assistance promptly from Student Care and Outreach:

<https://sco.uga.edu> or 706-542-7774

They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services. It is always easier to address exceptional circumstances when you raise these concerns as early as possible. Waiting until the end of the semester to take action may limit my ability to provide you with appropriate support.

UGA has several resources for a student seeking mental health services or crisis support:

<https://www.uhs.uga.edu/bewelluga/bewelluga> (mental health)

<https://www.uhs.uga.edu/info/emergencies> (crisis support)

If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA (see URL above) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center. Additional resources can be accessed through the UGA App.

Course Topics and Schedule

The following schedule of topics is approximate and subject to change:

- Brief review of spatial quantum mechanics
- Ch. 6, Unbound States
- Ch. 7, Angular Momentum
- Ch. 8, Hydrogen Atom
- Ch. 10, Perturbation Theory
- Ch. 11, Hyperfine Structure and the Addition of Angular Momenta
- Ch. 12, Perturbation of Hydrogen
- Beyond the hydrogen atom (time permitting)

Disclaimer

Unexpected circumstances and concurrent course assessment may require changes to the rules and information contained in this syllabus. If so, such changes will be done as fairly as possible, and you will be kept informed of the changes and their causes.