Course Information
Physics 411: Introduction to Quantum Mechanics
Fall Semester 2020

Meeting Time, Location, etc.: Tuesdays and Thursdays, 11:30 am – 12:45 pm, room Nielsen 415, located immediately to the left at the main entrance of the Physics Bldg.

Instructor: Prof. Elbio Dagotto, office: third floor South College building
edagotto@utk.edu ← email will be a very efficient means of communication this fall.

Textbook: *Introduction to Quantum Mechanics,* 3rd edition, D.J. Griffiths (brown cover).

There will be a total of 28 lectures days, including days for midterm exams and days for preparation for those exams.

Please arrive on time. The lectures in PDF format will appear in the web page
http://sces.phys.utk.edu/%7Edagotto/QuantumMechanics/index2020.htm
shortly after being delivered. I will do my best to send the afternoon before class the .pptx file if you wish to glance in advance, or take notes during lecture in that file. Taking notes in class is encouraged (asking questions, particularly "trivial" ones, also).

This will be a **combination F2F+Zoom environment**. Whoever wishes to use Zoom on a day of F2F, there is no need to notify me in advance. I am planning to have some days to be only Zoom, maybe 20% or 25% of the lectures, to reduce a bit the chances of contagion. All this is evolving, we will see how it goes. Certainly you will be alerted a couple of days before in case a F2F+Zoom becomes only Zoom. I was not planning to record my lectures to induce the discipline in students to follow the class regularly. But perhaps the university will require me to record.

First class: Thursday, Aug 20, 11.30 am - 12.45 pm
Last class: Tuesday, Nov 24, 11.30 am - 12.45 pm
Final exam: Tuesday, Dec 8, 10.30 am - 12.45 pm

Office Hours: Previous experience shows that students asking questions as the issues arise, as opposed to "at a fixed office hours time", works better in practice. See next.

Questions: Contact Prof. Dagotto by **email** for short questions. Example, you can send me a specific question or photographs of calculations that are causing trouble and I will do my best to help fast. I noticed **whatsapp** audio communication is also working well for many: you can text me a question (I will provide my phone number first class) and if the answer requires more than a couple of lines of typing, I can record in audio my response and even send you photographs of sketches by hand as illustration. Plus whatsapp audio can be heard by the students many times and photos can be saved. If this fails, we can simply talk by phone, being careful not to be disruptive to those around us.

Prerequisites: Physics 411 requires a high degree of mathematical sophistication. *Confidence with simple derivatives, integrals, differential equations, linear algebra (matrices, eigenvalues, eigenvectors), and elementary operations of complex numbers (addition, multiplication, complex conjugate, $e^{ix} = \cos x + i \sin x$ notation, etc.), are essential for success in this course.* **From previous experience I know your main obstacle in this class will not be QM or the teacher, but will be your background in math.** Good news is that you will NOT be asked to solve complicated integrals or complicated differential equations, only simple ones. Any complicated integral etc needed to solve a problem will be provided.

Physics 411 is the first semester of a two semester sequence (with 412) and is **mandatory** for all physics majors pursuing the Academic Physics Concentration. 411 will deal with the foundations of quantum mechanics and the development of formalism and techniques. I anticipate that the topics of Physics 411 will roughly cover most of chapters 1-4 of Griffiths and will follow the text *quite closely*, although not all sections of those chapters will be addressed. Specific topics will include:

- The wave function and the uncertainty principle.
- The time-independent Schrödinger Equation.
- One-dimensional potentials, such as the square well and harmonic oscillator.
- Introduction to linear algebra, Hilbert Space, Hermitian operators.
- Schrödinger Eq. in 3-Dimensions, hydrogen atom, angular momentum, spin.

Course Information
Lecture notes, problem assignments, and exams will be located in the web page of the course http://sces.phys.utk.edu/%7Edagotto/QuantumMechanics/index2020.htm
The professor will do his best to send homework problem assignments by email and later I will send my solutions (shortly after your deadline). But it is the student's responsibility to remain current with posted information.

Grading
In addition to the lectures, the course will include problem sets, two midterm exams, and a final (which will be like a third midterm exam in practice). Course grades will be determined by a weighted average of:

(1) Problem Sets weight 40% (here a grader designated by the department will grade, with the exception of the first set that the prof will handle)
(2) Test 1, weight 20% ← covering first third of semester; tentative 9/22 or 9/24.
(3) Test 2, weight 20% ← covering second third of semester; tentative 10/22 or 10/27.
(4) Final, weight 20% ← "final" will cover the last third of semester.
Midterm and final exams will be graded by professor.

Problem Set Policy The solving of problems is an essential part of this course.

It is allowed for students to work together on the HW problem sets. Interactions of this kind are much encouraged. However, **solutions to HW problem sets must be submitted in each student's own hand.** We will decide as we go by what means you deliver the HW in this "time of the virus", but probably you will have to learn to scan into PDF and submit to a given email address, or photograph the HW and submit.

The given HW sets will include the deadline clearly written (typically you will have one week to complete). This deadline is strict. Shortly after deadline, solutions will be sent to all students by email. Graded HW will be returned within a week or earlier. It is crucial that you present the solutions in a well-organized manner, with framed results, showing your work. **We are more interested in your procedure to solve a problem, more than the final result.** Make sketches by hand if needed to explain better your solutions. No need to save paper. **Partial credit will be generous. Take advantage of the possibility of collecting close to 40% of the grade via HW.** Plus you will be well prepared for exams by understanding the HW problems.

Note: Read in https://www.aacu.org/leap/students/employers-top-ten the top ten things employers look for in new college graduates. Among them is the ability to write and speak well, and think clearly about complex problems. QM will help to develop these abilities!

Tests Schedule
The dates of the tests will be announced in class, by email, and they will be posted in the class web page. Tentatively they are: **Test 1, Sept 22 or 24, Test 2 Oct 22 or Oct 27.** The date of the final (Test 3) will be made available on the University Academic Calendar and it is fixed by UT. It is the student's responsibility to remain current on these dates. **For all the tests, the lecture before will be for students to ask questions. Do not be shy. You will not be graded or judged based on the type of question you formulate.**

No curve, but generous grade scale:

90-100	A
85-90	A-
80-85	B+
75-80	B
70-75	B-
65-70	C+
60-65	C
55-60	C-
Less 55	D,F range

University Disability Statement
Any student that may need a special accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the
Office of Disability Services at 865-974-6087 in Hoskins Library to coordinate reasonable accommodations for students with documented disabilities.

About virus motivated expected behavior please read https://provost.utk.edu/wp-content/uploads/sites/10/2020/06/Syllabus-language-masks-and-social-distancing.pdf