# Course Information
Physics 412: Introduction to Quantum Mechanics
Spring Semester 2023

Meeting Time, Location, etc.: Tuesdays and Thursdays, 11:20 am – 12:35 pm, room Nielsen 304, one floor down from the main entrance floor of the Physics Bldg. Please arrive on time.

Instructor: Prof. Elbio Dagotto, joint faculty UT-ORNL. **Office:** 3th floor South College building. *edagotto @utk.edu* ← email will be the best means of communication this spring. Second best, texting. Third, Whatsapp using recording and photos of formulas.

Textbook: *Introduction to Quantum Mechanics,* 3rd edition, D.J. Griffiths (brown cover).
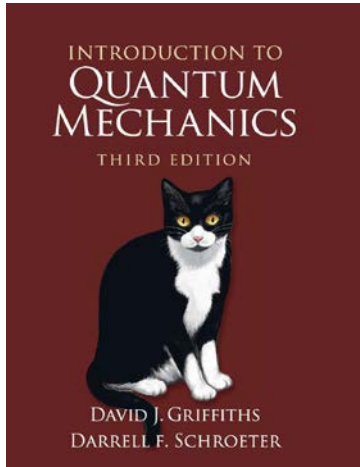
There will be a total of 28 lectures, including 2 days for midterm exams, and ½ lecture preparation days for those exams.

The lectures in PDF format will appear in the web page http://sces.phys.utk.edu/~dagotto/QuantumMechanics/index2023.htm shortly after being delivered. The afternoon before class, I will try to send you the .pptx file if you wish to glance in advance, or to take notes during lecture in that file via a tablet. Taking your own notes in class is encouraged. Asking questions, particularly "trivial" ones, also!

This class will be **in person**. Not sure about mask policies yet.
6-feet policy with teacher is encouraged☺.

First class: Tuesday, Jan 24, 11:20 am – 12:35 pm
Last class: Tuesday, May 9, 11:20 am – 12:35 pm
Final exam: fixed by university, final will be Monday May 15, 3.30 to 6.00 pm.
No class on March 14 and 16 (Spring Break) and no class on April 6, Thursday.

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

Prof. Dagotto by **email** for short questions at any time. You can send me a specific question or photographs of calculations that are causing trouble and I will try to help fast.

Whatsapp communication works well for many: 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 my response and/or send you photographs of sketches or calculations 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 talk by phone or Zoom, being careful not to be disruptive to those around us.

After class is also a great time to ask questions.

Prerequisites: P412 requires P411, the quantum portion of Modern Physics, as well as a solid mathematical foundation. Confidence with **simple** derivatives, integrals, differential equations, linear algebra (matrices, eigenvalues, eigenvectors), and, **especially**, elementary operations of complex numbers (addition, multiplication, complex conjugate, $e^{ix} = cosx + i\,sinx$ called Euler formula, absolute value of a complex number, 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.

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 in an exam or HW will be provided.

Physics 412 is the second semester of a two semester sequence (with 411) and is mandatory for all physics majors pursuing the Academic Physics Concentration. 412 will start with Ch. 5 and then address a "selection" of topics from various chapters. My apologies but there is zero chance that we can cover the entire book. It is better to learn a smaller number of items very well, than many only superficially.

Course Information: Lecture notes, problem assignments, and exams will be located in the same web page as given before
http://sces.phys.utk.edu/~dagotto/QuantumMechanics/index2023.htm

Professor will send homework (HW) problem assignments by email. HW will also be posted in the class web page. Shortly after your HW deadline, I will send my solutions.

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

(1) HW weight 40% (here a grader designated by the department will grade, with the exception of the first HW set that the professor will grade)
(2) Test 1, weight 20% ← covering first third of semester; on Thursday 2/23.
(3) Test 2, weight 20% ← covering second third of semester; on Tuesday 4/4.
(4) Final (aka Test3), weight 20% ← "final exam" will cover the last third of semester.
The lowest score of the three Tests will be dropped for the final grade.

Midterms and final exam will be graded by professor.

HWs will be graded by our new grader (PhD Grad Student Seunghoon Song, email ssong17@vols.utk.edu). You can find his mailbox using the photos below (room 401B) by focusing on thered frames:

Students will leave their HW directly in the grader's mailbox by the deadline. We will aim that graded HW will be returned to students the lecture after the HW deadline.

HW Policy: Solving problems is an essential part of this class. Students are allowed to work together on the HW problem sets. These interactions are encouraged. However, **HW sets' solutions must be submitted in student's own hand.**

The given HW sets will include the deadline (day and time) 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 "thinking" 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.

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 on Feb. 23, and Test 2 on April 4.** The date of the "final" is fixed by the University Academic Calendar, thus **Test3 will be on May 15**. It is the student's responsibility to remain current on these dates because they may change. **For all the tests, the lecture before will be, partially or fully, for students to ask questions or for the instructor to give practice problems.**

No "curve" grading, but generous grade scale:

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

Example: suppose we have only 2 HWS and the usual 3 tests in the semester.

HW: Each HW problem will be graded from 0 to 10. Suppose in HW1 there are 4 problems and in HW2 there are 2 problems. Then, the max total grade possible would be 40+20=60. Suppose you receive 50 of those points. Then, for HW your number will be (50/60) x 40=33.3 in this example. The 40 is because we give weight 40% to HW.

Tests: All tests will be from 0 to 60 points. Suppose in Test1 you receive 40/60, in Test2 50/60, and in Test3 30/60. Then, your number for tests would be ((40+50)/120) x 60= 45. Note we dropped Test 3 for being the lowest. The 60 multiplying at the end is because we give weight 60% to Tests.

Then, your final number is 33.3+45=78.3. Using the grade scale above, your final grade will be B.

Note: Read in Skills Employers Look for in College Graduates the top ten things employers look for in new college graduates. Among them is problem-solving skills, critical thinkers, good communication abilities, etc. The QM class will help developing these abilities!

University Disability Statement
The University of Tennessee, Knoxville, is committed to providing an inclusive learning environment for all students. If you anticipate or experience a barrier in this course due to a chronic health condition, a learning, hearing, neurological, mental health, vision, physical, or other kind of disability, or a temporary injury, you are encouraged to contact Student Disability Services (SDS) at 865-974-6087 or sds@utk.edu. An SDS Coordinator will meet with you to develop a plan to ensure you have equitable access to this course. If you are already registered with SDS, please contact your instructor to discuss implementing accommodations included in your course access letter.