

# Course Information

## Physics 412: Introduction to Quantum Mechanics

### Spring Semester 2019

**Meeting Time:** Tuesdays and Thursdays, 11:10 am – 12:25 pm, room 306 Physics. This is a total of 28 lectures including 2 days of midterm exams. Please arrive on time. The lectures in PDF format will appear in the web page shortly after being delivered, but I encourage that you take notes in class (and ask questions of course).

*First class meeting on Thursday, Jan 10*

*Class will **not** meet on Tuesday March 19 and Thursday March 21 (Spring Break)*

*Class will **not** meet one day of April because of professor's trip (day not fixed yet)*

*Last class meeting on Thursday, April 25*

*Final exam: to be decided by the university sometime April 30 to May 7.*

**Class room location:** Nielsen 306 (Physics Bldg.)

**Instructor:** Prof. Elbio Dagotto, office: third floor South College building  
[edagotto@utk.edu](mailto:edagotto@utk.edu) ← very efficient means of communication!

**“Office Hours”:** Contact Prof. Dagotto by email for short questions, or for special office appointments at times mutually convenient for more in depth discussion.

**Textbook:** *Introduction to Quantum Mechanics*, 2<sup>nd</sup> edition, D.J. Griffiths ([blue cover](#)).

**Prerequisites:** Physics 412 requires a high degree of mathematical sophistication. *Confidence with simple derivatives, integrals, differential equations and linear algebra (matrices, eigenvalues, etc.) are essential for success in this course.*

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 finish dealing with the foundations of QM and then move into applications.

We will follow the text *quite closely*. Specific topics will include:

- Ch. 4: Spin, Pauli matrices, addition of angular momenta.
- Ch. 5: Two identical particles, bosons and fermions. Atoms, solids, quantum statistical mechanics.
- Ch. 6: Non-degenerate and degenerate perturbation theory. Fine structure of Hydrogen. Zeeman effect.
- Ch. 7: Variational principle and application to He atom and H molecule.
- Ch. 8: WKB approximation, tunneling.
- Ch. 9: Time-dependent perturbation theory. Two levels. Emission, absorption, and spontaneous emission of radiation.
- Time allowing, we may cover some topics of Chapters 10, 11, and/or 12.

## Course Information

Lectures, problem assignments, and exams will be placed in the web page of the course [http://sces.phys.utk.edu/~dagotto/QuantumMechanics/index2019\\_Spring.htm](http://sces.phys.utk.edu/~dagotto/QuantumMechanics/index2019_Spring.htm) Professor will send lectures, HW problems and solutions via email to everybody, as in QM 411. But it is the student's responsibility to remain current with posted information.

## Grading

Besides lectures, the course will include homework (HW) problem sets, two midterm exams, and a final. Course grades will be determined by a weighted average of:

- (1) Problem Sets weight 40% (here a grader designated by the department will grade)
- (2) Midterm 1, weight 20% ← covering first third of semester; [tentative 2/7 or 2/12](#).
- (3) Midterm 2, weight 20% ← covering second third of semester; [tentative 3/12 or 3/14](#).
- (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 sets. Interactions of this kind are *much encouraged*. However, solutions must be submitted in each student's own hand.

HW sets will include the deadline (one week typically). This deadline is strict. Solutions will be sent to all students by email, shortly after deadline. It is crucial that you present the solutions in a well-organized manner, with framed results, showing your work. *Often we are 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.

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.

## Exam Schedule

The dates of the midterm exams will be announced in class, by email, and they will be posted in the class web page. The date of the final will be made available on the University Academic Calendar and it is fixed by the university. It is the student's responsibility to remain current on these dates.

## 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.