PHYSICS 389K (56485), FALL 2019

Instructor:
Willy Fischler, RLM 9.310A
email: fischler@zippy.ph.utexas.edu
Office Hours: Wednesdays 11:00 am - noon
Announcements posted on Canvas: http://canvas.utexas.edu/
Homeworks and solutions will be regularly posted on Canvas: http://canvas.utexas.edu/

TA:
Stefan Eccles, RLM 9.308
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Office Hours: Fridays, 4-5pm

Textbook:
There are a large number of books on quantum mechanics, the main reference in this course is : "Modern Quantum mechanics" by J.J. Sakurai, editor: Pearson. A more recent textbook with an extensive discussion of postulates and measurement is: "Lectures on Quantum Mechanic" by Steven Weinberg. In addition to textbooks there are by now several courses on quantum mechanics available on the web.

Course content:
Quantum Mechanics is a rather confusing subject, in order to set the basic concepts we will start by discussing the mathematical formalism that describes it. For the sake of simplicity we will start with two state systems. This will prepare us for more complex systems. The order of the subjects covered will roughly follow Sakurai's book.
- Basic Physical and Mathematical Concepts of QM: Quantum states and the Hilbert space: observables, operators, bases and matrices, commutation relations and uncertainty rules, the relation between momentum and space translations. Density matrix and Von Neumann entropy.
- Quantum Dynamics: Schrodinger and Heisenberg-Dirac equations; canonical quantization; operator quantization of the harmonic oscillator. - Wave Mechanics: Bound states, scattering states, charged particles coupled to an electromagnetic field. - Rotations and Angular Momentum: The angular momentum spectrum, representations of SU(2). Orbital angular momentum and the central potential. Addition of angular momenta, Clebsch-Gordan coefficients, tensors and Wigner-Eckart theorem. Other symmetries and applications including conservation laws including the algebraic derivation of the Hydrogen atom energy spectrum.
- Approximation methods: Perturbative: perturbation theory including applications using time-independent perturbations both the non-degenerate and degenerate cases and time dependent perturbations. Non-perturbative: semi-classical WKB approximation, Born-Oppenheimer approximation.
If time permits we may cover more subjects to be determined.

Attendance:
Class attendance is not mandatory but is strongly recommended. Class interruptions such as

arriving late, leaving early, or chatting, are unacceptable. Your cooperation in maintaining a good atmosphere for learning is required.

Grades:
The grades will be based upon homeworks (40%), one in class midterm exam (20%) and a mandatory final exam (40%). The exams will consist of questions similar to those on the homework.

Midterm exam: Thursday, October 15 in class. Final Exam: tba

Homeworks:
Will be assigned approximately weekly. You are encouraged to discuss homework with anyone you wish.

Other:
Announcements will be posted on "Canvas": http://canvas.utexas.edu
Last day of the official add/drop period is September 3.

Please notify me of any modification/adaptation you may require to accommodate a disability-related need. You will be requested to provide documentation to the Dean of Student's Office, in order that the most appropriate accommodations can be determined. Specialized services are available on campus through Services for Students with Disabilities. 471-6259, http://www.utexas.edu/diversity/ddce/ssd/

- Academic dishonesty will not be tolerated. For more information see http://registrar.utexas.edu/catalogs/g
10/ch01/index.html

- By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an exam, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.