

Physics 4301 Quantum Mechanics

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Tuesday, Thursday 4:00-5:15 PM in CB1.108

Syllabus Updated: 1/9/07

- Text: Introduction to Quantum Mechanics, 2nd Edition by David J. Griffiths. We will cover Chapters 1 - 4, a brief review of Appendix A, and if time permits, we'll study parts of Chapters 5 and 6.
- Topics: Fundamental principles of quantum theory with application to one and three dimensional systems under various potentials; free particle; bound particle; harmonic oscillator, angular momentum, hydrogen atom, and (time permitting) exchange symmetry, time-independent perturbation theory.
- Office hours: Tuesday, Thursday 3:00 – 4:00 PM.
- TA Delilah Whittington 972 883-2867 FO 1.432 delilah.whittington@student.utdallas.edu Office hours: Tues 1-2 PM.
- HW: Quantum will require your flexing your mathematical and philosophical muscles. Unless you live with these problems, you will not 'get it'. There are no shortcuts. Homework assignments and other important course announcements will be posted via a WWW based discussion Yahoo®!Group no later than Thursday of each week. Please join the group by sending an email to phys4301-subscribe@yahoogroups.com and then follow the instructions in the return email. You may choose to read and send postings by email or via the WWW at <http://groups.yahoo.com/group/phys4301/>. It is your responsibility to join the group and check for postings. The Yahoo®!Group is also intended to be a discussion/question/answer forum for the class. You are expected to keep posts on topic, following commonly accepted practices of netiquette. To unsubscribe use phys4301-unsubscribe@yahoogroups.com.
- Homework is due at the start of the first class meeting of the week, typically on Tuesday unless otherwise specified.
- You may ask any of your classmates for homework hints. **You are encouraged to do so, especially when you are having trouble getting started on a problem.** Hints and advice must be given completely **orally**, and the hintee may not look at the hinter's written homework or notes.
- You may not consult the homework of previous Physics 4301 classes, solutions to previous years' homework sets, online solutions to Griffiths' problems, or the publisher's solutions manual without the explicit consent of Prof. Izen. You may only use those Internet resources listed by Prof. Izen to prepare you homework. Past HW policy violations have resulted in UTD disciplinary proceedings.
- Exams: There will be three exams. The last exam may be given during Finals period, but it will not be comprehensive. You are specifically forbidden to consult previous years' tests or solutions, nor may you ask previous classes about the contents of previous tests. If you inadvertently become aware of material from past years' tests, please describe the exact nature of the violation in writing and hand it in with your examination. Aside from freely divulged, inadvertent violations that will be handled at Prof. Izen's discretion, you should assume violations will trigger a UTD disciplinary proceeding. I make an effort to vary test questions from year to year, but some duplication is inevitable due to the limited pool of Quantum Mechanics questions appropriate for an in-class test that are solvable in closed form.
- Grading: HW: 15%. Top 2 Exams scores: 35% each. Lowest exam: 15%. Adjustments as necessary for quizzes.
- Honesty: In addition to the course policy on consulting past exams and homework, plagiarizing the work of other students, providing information to other students during an exam or quiz, or bringing information into an exam or quiz in any way that is not explicitly approved by Prof. Izen is forbidden. Should you inadvertently violate a course rule such as disclosing information to another student, or inadvertently become aware of information on another student's examination or quiz, please bring it to the attention of Prof. Izen or the exam proctor immediately. Aside from freely-divulged, inadvertent violations which will be handled at Prof. Izen's discretion, confirmed violations of course policies will **certainly** result in the creation of a disciplinary file with the University's judicial officer, and other penalties as allowed under the University's disciplinary guidelines for intellectual honesty.
- Prereqs: PHYS 3311 and PHYS 3352 and either MATH 2333 or MATH 2418.

Objectives: Mastery of the fundamental axioms of quantum mechanics
Understanding of commutation relations and the uncertainty principle
Understanding of the Hilbert space of wave functions
Facility to solve 1-D bound state problems and 1-D scattering problems
Understanding of the relationship between Schrödinger wave functions and Heisenberg matrices
Understanding of the Fourier decomposition of wave packets
Understanding of angular momentum, angular momentum addition
Understanding the solution of 3-D radially symmetric potentials, such as the Coulomb potential in single-electron atoms.

Assessment of Objectives: Weekly graded homework problems, and focused test questions.

Course schedule: Approximate date of Exam I (Chapters 1 and 2) February 8
Approximate date of Exam II (Chapter 3) March 15
Exam III (Final Exam) April 26 2PM

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details).

Please consult Course and Instructor Policies for more specific information pertaining to this course. It is a student's responsibility to seek guidance if a policy or its application to a specific situation is not clear.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:
The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.