

Course Syllabus

PHYS 4301 Quantum Mechanics I Spring 2008

Professor Contact Information

Instructor: Jim Huffman (214-567-5354)
E-mail: jhuffman@utdallas.edu I will send e-mail to UTD e-mail addresses only.
Mailbox: in physics office
• The Class will meet on Tuesday and Thursday from 4p to 5:15p in CB1.102

Course Pre-requisites, Co-requisites, and/or Other Restrictions:

You need to have done: PHYS 3311, PHYS 3352, MATH 2333 or MATH 2418

Course Description:

Fundamental concepts: the Stern Gerlach experiment; the Dirac formalism; kets; bras and operators; base kets and matrix representations. Measurements, observables and the uncertainty relations. Position, momentum, and translation. Wave functions in position and momentum space. Time evolution and Schrödinger's equation, Heisenberg picture. Applications include simple harmonic oscillator and the Hydrogen atom.

Student Learning Objectives/Outcomes:

- gain the understanding and formalism of Quantum Mechanical Modeling of simple systems
calculate physical observables which are represented by operators in Hilbert Space
calculate physical properties of simple quantum systems
gain some exposure to current event in quantum devices and quantum computation

Required Textbooks and Materials:

- We will use the book "Introduction to Quantum Mechanics" (second edition) by David J. Griffiths .
Please make an effort to get the book quickly. I will be assigning homework from it and assume that you have access to it from the beginning of classes.
The class project may require the use of MATLAB and outside research materials, which are available in the computer lab

Suggested Course Materials:

- Pen or Pencil, Paper, and Calculator.
MATLAB, library, internet

Assignments & Academic Calendar:

Homework will be assigned in class and will be due one week later. Begin your homework as soon as you can because many problems are too difficult for a last-minute effort.

Projects will be assigned in classtime and will consist of research and mathematical modeling of current issues and devices in Quantum Physics that I will provide. A final project will be due at the end of the year, which will include a description and mathematical model of your favorite quantum topic or device.

Doing homework is an important part of the learning process. When writing a solution, it is especially important to write comments that explain both what you are trying to do and how you are trying to achieve it. At any point during the semester, I will feel free to ask any member of the class to explain any aspect of a homework problem to me.

A tentative schedule for the course is as follows;

Table with 3 columns: Date, lecture, Topic. Rows include dates from 1/08 to 3/25 and topics like Introduction and Basic Statistics, Schrödinger Equation, Vector Space, and 3 Dimension QM.

3/27 – Thursday		Midterm 2
4/01 – Tuesday	21	3 Dimension QM
4/03 – Thursday	22	Hydrogen
4/08 – Tuesday	23	Angular Momentum
4/10 – Thursday	24	Spin
4/15 – Tuesday	25	2 Particle Systems
4/17 – Thursday	26	Atoms and Solids
4/22 – Tuesday	27	Atoms and Solids
4/24 - Thursday	28	Atoms and Solids
Scheduled	<b>Final (comprehensive)</b>	

The University arranges the final exam. Please check the UTD web page to check the scheduled time just before this exam. <http://www.utdallas.edu/student/registrar/finals/>

- I do not intend to cover all sections in the text
- I do not intend to follow the order in which the material is presented in the text
- I intend to present some material in the text in a slightly different fashion from the text. Please take good notes!

#### Grading Policy:

I intend to use a grade scale as follows:

96-100	A+
92-96	A
88-92	A-
84-88	B+
80-84	B
76-80	B-
72-76	C+
68-72	C
64-68	C-
60-64	D+
56-60	D
52-56	D-
Less than 52	F

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<b>Weighting:</b>	Homework	25%
	Projects	15%
	First midterm test	20%
	Second midterm test	20%
	Final Exam	20%

I do not intend to use a curve in my grading of individual tests. A grade of X (incomplete) is awarded if an unforeseen, non-academic emergency prevents a student from completing the work in a course. If a student wants to discontinue the course because a poor grade is expected, it is nearly always more appropriate for the student to withdraw from the course and re-register in another semester. If an incomplete is given, the course must be completed within eight weeks of the first class day of the next long semester.

**Missed tests can only be made up in the case of documented, extenuating circumstances.** Such circumstances include medical emergencies and work-related travel that cannot be re-scheduled.

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#### Course & Instructor Policies

Doing homework is an important part of the learning process. **Feel free to form study groups etc.** However, it is important to **hand in work that is your own**. When writing an answer to a question, it is important to write comments that explain both what you are trying to do and how you are trying to achieve it. In addition to the homework problems that are handed in for grading, I may suggest that you work problems other than homework problems. These are worth looking at as they improve your ability to solve problems.

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#### Dishonesty:

I would like to emphasize a point about the use of secondary sources etc. I do not object to people discussing problems that they have already attempted. I do not object to the use of any other textbooks that you come across. I object strongly to any verbatim, unacknowledged work done by anyone other than you and presented as part of your work. **(This includes any passages from textbooks, any solutions that you come across in hard copy or on WebCT etc. It also includes work produced by any other member of the class [past or present]).** Every student in the course agrees to this limitation. Further, all students agree to tell me the source of any solution to any problem assigned in PHYS 3311 that they know about. **No materials posted on the WebCT site become the property of the student.** At the conclusion of the course, all students undertake to either keep all course materials (posted solutions, graded homework etc.) for their exclusive use. Any distribution of course materials to third parties constitutes academic dishonesty and will be reported to the Dean of Students

In order to further the objective of eliminating scholastic dishonesty, the University has a policy on scholastic dishonesty. This policy is clearly articulated in Subchapter F section 49.36 of the policy on student discipline & conduct adopted by the University and used in this course. The full chapter 49 is at <http://www.utdallas.edu/student/slife/chapter49.html> Students enrolling in the course are bound by this policy and are encouraged to read it. Any questions about this policy can be asked of the Dean of Students. **Any suspected cases of scholastic dishonesty will be passed along to the Dean of Students.**

Students are welcome to ask questions of the SI or me about homework problems. However, I do not authorize these students to communicate such discussions to other students. These other students are welcome to ask me questions too.

**The WebCT site contains postings exclusively for the use of the person with the privilege accessing the site.** Materials on this site form another secondary source that is intended to help students in my class during the semester that the posting is made. No materials posted on the WebCT site become the property of a student. **Students acknowledge that distribution/transmission of any posting made on the WebCT site constitutes scholastic dishonesty.** (See parts (d) 1 and (d) 5 of section 49.36 of the policy on student discipline & conduct.)

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#### **A note about missing classes**

First of all, please try not to! **If something arises that prevents you from attending class, please inform me as to why by e-mail.** Not everything that we do in class is covered in any single textbook. If there were an ideal textbook for us then there would be little or no need for classes. An ideal textbook does not exist. By missing class, you will miss either something not covered by the book that you are reading, or you will miss 'intermediate steps' in an author's argument that will help you follow along. You also pass up the opportunity to ask questions of your own and miss out on hearing the questions of others. (This latter point is significant. Other students may ask questions that haven't occurred to you yet and hence develop your understanding of the subject.)

If you **have** to miss class for some reason then it is your responsibility to get class notes or handouts given in class. Please do this quickly after your absence. (I'm not keeping tabs on your attendance and leave some of the responsibility to you.) In order to understand the next lecture given, you will need to have obtained and worked through any notes etc. from the previous lecture. I give lectures from 'outline notes' that are probably not what you want to read. If you miss a lecture then your best source of class notes is another student who wrote down exactly what we actually did.

I return graded homework and tests primarily in class. Again, you'll miss this if you are absent from class. After I have tried to return the graded work to you a class from which you were absent, the responsibility for getting it from me becomes yours.

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#### **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). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

#### **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.

*These descriptions and timelines are subject to change at the discretion of the Professor.*