



**Chemistry 3521 (Fall, 2007)**  
**Farooq A. Khan**

Welcome to CHEM 3521! This course provides an introduction to quantum mechanics, with applications to problems in atomic structure, chemical bonding and spectroscopy. Much of the terminology, quantum numbers, orbitals, and Morse potentials is at least *qualitatively* familiar to you from previous courses. In this course, we will start exploring these concepts *quantitatively*.

**Learning Outcomes**

A student who successfully completes this course is expected to develop the ability to:

- Apply the principles of quantum mechanics, including elementary operator theory and differential equations, to chemical systems; and
- Demonstrate knowledge of a quantum mechanical treatment of atomic structure and chemical bonding, and atomic and molecular spectroscopy.

**General Information**

<b>Instructor</b>	Farooq A. Khan Phone (678) 839 – 6027 Office: 2-117 TLC email: <a href="mailto:fkhan@westga.edu">fkhan@westga.edu</a> <b>Please note: Please only use your UWG email accounts to contact me.</b>
<b>Class time</b>	<b>M, W, F</b> 10:00 – 10:50 am
<b>Textbook</b>	<b>Physical Chemistry</b> 8 <sup>th</sup> edition, Atkins and dePaula <b>Thirty Years That Shook Physics</b> , Gamow
<b>Office Hours</b>	<b>Mondays</b> 11:00 am – 12:00 noon; 3:30 – 4:45 pm <b>Wednesdays</b> 11:00 am – 12:00 noon; 3:30 – 4:45 pm <b>Thursdays</b> 10:00 am – 12:00 noon; 1:00 – 4:45 pm
	Additional office hours, by appointment

### **A word about expectations**

It is very likely that you have heard a lot of stories about this course. It is true that the language in this course is in large part mathematical. It is also true that in a first exposure quantum mechanics may seem abstract, and just *different* from anything you have seen earlier. Having said that, I must point out that quantum mechanics is really “cool” and ultimately underlies all chemical phenomena.

Four words summarize a tried and tested strategy for learning the most in this course. *Take your homework seriously*. Homework assignments will be given regularly during the semester. Approximately 60 % of questions on the examinations will closely resemble these assignments. As a student (which was not *that* long ago!), I always found it useful to supplement lectures with informal study sessions with my peers. You will be pleasantly surprised to find that a fellow student can clarify a concept or provide cute short-cuts while solving problems.

Homework assignments will be due typically on Wednesdays, which will be designated for in-class interactive problem solving. These problem-solving sessions will be conducted by your instructor along with Professor Lucille B. Garmon, an invited participating instructor.

Let us make a deal. I will attempt to anticipate any difficulties you may have with the underlying mathematics. Y'all do your homework and in-class problem solving seriously.

### **Examinations**

**Three short in-class examinations** will be given on the following Fridays:

September 7

October 19

November 9

**Two long examinations** will be given on the following Friday afternoons, with the timings decided in consultation with the class:

September 28

November 30

**The final examination will be given on Friday, December 7 (8:10 am – 10:00 am).** It consists of multiple-choice questions, and is prepared by the American Chemical Society.

**A take-home examination will be administered in November.** At least two weeks will be given for this examination.

**No make up examinations will be given.** In case of an illness or a dire emergency, a student may be excused from one in-class examination, provided the instructor is contacted prior to the examination. If excused, the score for this examination will be the average of all in-class examinations. **At the discretion of the instructor, an addendum to an in-class examination may be given in the form of an announced in-class quiz or a take-home assignment, which must be completed by a specified date.**

### **Grades**

Your grade will be calculated based on the following components:

<b>Short in-class examinations (3 @100 points each)</b>	<b>300 points</b>
<b>Long examinations (2 @ 150 each)</b>	<b>300 points</b>
<b>Take-home Examination</b>	<b>100 points</b>
<b>Homework and in-class problem solving</b>	<b>100 points</b>
<b>ACS Final</b>	<b>200 points</b>

**The final may be curved at the discretion of the instructor.**

<b>TOTAL</b>	<b>1000 points</b>
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### **Letter grades**

<b>Score</b>	<b>Grade</b>
85% - 100%	A
75% - 84%	B
60% - 74%	C
50% - 59%	D
0% - 49%	F

### **Policy on cheating**

Occurrences of cheating are rare. However, cheating by one individual raises questions about fairness for the rest of the class, and indeed, endangers the honor code that governs our examination system. It is after considerable thought and agonizing that I have arrived at the following formula. If an individual cheats on an examination for the first time, he/she will obtain a score of zero for that particular examination. If an individual is caught cheating a second time during the semester, he/she will receive a grade of F for the entire course.