CHM320 (Physical Chemistry I) Syllabus: Spring 2018

Instructor:

Prof. Hee-Seung Lee
Office: DO 230B
Office Hour : Anytime when my office door is open (except Tue, Thr and Fri morning before class) or by appointment
Contact : leehs@uncw.edu
Lecture: Tue, Thr 12:30 am – 1:45 pm and Fri 12:30 – 1:20 am (DO132)
Class Homepage: **http://people.uncw.edu/leehs /CHM320/**
(Blackboard has a link to the homepage as well)

Course Description:

CHM-320 (4 cr. hr.), *Physical Chemistry I: Quantum Chemistry and Spectroscopy*, is the first part of a two-semester sequence that surveys important topics in physical chemistry. The central problem treated in CHM320 is the properties of single, isolated atom and molecule. At the beginning of the course, students will learn that classical mechanics is not appropriate to describe the behavior of atoms and molecule. Subsequently, basic concepts in quantum mechanics will be introduced to students as a tool to understand the behavior of microscopic world of atoms and molecules.

Prerequisite:

MAT 161 and 162 are essential. Students **MUST** have clear understanding of differentiation and integration.

Course Outline:

Chapter 1. Classical mechanics and particle nature of light
Chapter 2. Wave nature of matter
Chapter 3. The Schrodinger equation
Chapter 4. Mathematical machinery of quantum mechanics
Chapter 5. Quantum mechanics in multi-dimensions
Chapter 6. Hydrogen atom
Chapter 7. Multi-electron atoms
Chapter 8. Molecular quantum mechanics

Textbook:

There is NO required text book. However, It will be helpful to have a textbook as additional reading material. It is recommended to have *Physical Chemistry: A Molecular Approach* by McQuarrie and Simon. This is by far the best PChem text book available.

Homework:

A weekly problem set will be posted on the class homepage. Homework will not be collected, nor graded. But, it is ***extremely important*** to work through homework problems by yourself to assess your understanding of course material and prepare for the exams.

Exams:

There will be three midterm exams and one final exam. The final exam is ***cumulative***, but the material covered after exam #3 will account for 60% of the final exam. Exam questions ***will NOT be multiple choices.*** These exams will be a combination of short answer questions and problems to be worked out. ***No midterm exam will be dropped***. If you do not take an exam, you will get zero point for that exam. Midterm exams and the final exam will be on the following dates and times. You may take an exam earlier than the scheduled time if you have a legitimate reason, but not later. ***No make-up exam*** will be allowed ***under any circumstance.***

Exam #1:	February 14	(Wednesday) 6:30 -- 8:30 pm (DO205)
Exam #2:	March 21	(Wednesday) 6:30 -- 8:30 pm (DO205)
Exam #3:	April 11	(Wednesday) 6:30 -- 8:30 pm (DO205)
Final Exam:	May 3	(Thursday) 11:30 am – 2:30 pm (DO132)

If you miss an exam due to an unexpected cause (e.g. health issue), I will review your case and may assign a grade I (incomplete pass). It is your responsibility to provide sufficient document to support your case.

Grading Policy:

Your final grade for CHM320 will be based on three midterm exams and the final.

Test type	Number	Percent Each	Total Percent
Hourly Exam	3	20 %	60 %
Final	1	40 %	40 %

Grades will be assigned based on the following table

A = 80 - 100	B+ = 75 – 79.99	B = 70 – 74.99	B- = 65 – 69.99
C+ = 60 – 64.99	C = 50 – 59.99	D = 40 – 49.99	F = below 40

Attendance Policy:

(1) According to the university catalogue,

*Students are expected to be **present at all regular class meetings and examinations** for the courses in which they are registered. It is the responsibility of the students to learn and comply with the policies set for each class for which they are registered*.

(2) Since there is no required textbook, attendance is essential. It is impossible for you to learn the course materials adequately and accomplish the stated student learning outcome (SLO) if you miss classes extensive number of times. Therefore…

(3) ***Attendance is mandatory***. However, you are allowed to miss up to ***10 lectures*** for any reason without a penalty (I will not ask why and you don't need to explain). This includes all absences (absences due to health issue, athletic events, family gathering, job interview, etc.). Note: There are total 41 lectures.

(4) If you ***miss 11 or more lectures*** (more than 25% of the total number of lectures), there will be 2 points deduction ***per a missed class*** (after the 10^{th} miss) from your final grade.

(5) If you miss 10 lectures, and you must miss one more lecture for whatever reason, this will result in a deduction of your grade. Therefore, you should keep track of the number of missed classes so that it won't happen at the end of semester.

(6) Sickness is NOT an excuse for missing more than 10 lectures. If you are too sick and have to miss classes for an extended period of time, you may consider withdrawing from the course. ***If you can't attend classes for a long period of time due to your health issue AND you can't drop the course since the dead line already had passed (or don't want to drop the course), you have to contact me ASAP.***

(6) If you ***miss more than 16 lectures*** (40% of the entire lectures), there will be 5 point deduction ***per a missed class*** (after the 16^{th} miss)

NOTE: 1. If you are late for more than 15 minutes or leave the classroom more than 15 minutes earlier, it will be counted as an absence.

2. If you have a legitimate reason to leave more than 15 minutes earlier or come 15 minutes late, ask for a permission ***before each class begins.***

Honor Code

Students honor code is strictly enforced. Student Academic Honor Code is available at the office of the dean of student (http://www.uncw.edu/odos/honorcode/).

Class Etiquette:

(1) ***Talking in class will not be tolerated.*** If you repeatedly disrupt classes, I will send your name to the Dean of Students and ***reduce your final grade for the course by a full letter grade*** (i.e. B+→ C+, etc).
(2) ***Cell phones must be turned off all the time*** in the lecture room even if you are early.
(3) ***Using your laptop or tablet in class is NOT allowed.*** If you need to use your tablet for taking notes, ask for a permission.

Hints for success in CHM320:

(1) *Attendance* :
Attending all lectures will be one of the most important factors for your success in CHM320. You CANNOT possibly be successful if you frequently miss classes. Physical Chemistry is not a collection of separate topics. If you start to fall behind, it is very difficult to catch up.
(2) *Lecture Note* :
You will soon realize that the ***lecture note is the key to this course***. The text book (not required) is considered as a reference and/or an additional source of information.
To reinforce the concepts presented in lectures, you must REWRITE your lecture note very soon after each lecture. The act of writing (with proper thinking) will help you understand the physical concepts.
(3) *Homework Problems* :
Homework problems will be posted on the class homepage. You should work out the problems as soon as they are posted. The exam questions will be similar to the homework problems in difficulty and scope. ***Doing all the homework problems the night before an exam is a prescription for failure!*** Once the answer key is posted, you should go over the key thoroughly and understand every detail. ***DO NOT try to memorize*** the answer keys of homework problems for exams. It will do more harm than good for you and I guarantee that it won't work!!!
(4) *Questions* :
If you have difficulty in understanding the concepts presented during lectures or doing homework problems, ***you must come and ask me***. You can stop by anytime whenever I am in my office or you may set up an appointment if you need extensive help or discussion. Do not wait until the day before each exam. ***Follow the lecture note every day and ask questions immediately.***

Student Learning Outcome:

1. Apply knowledge obtained in calculus and general physics to solve problems in chemistry.

2. Demonstrate an understanding of the fundamental postulates of quantum mechanics and apply them to simple model systems of chemical interest.

3. Describe the difference between classical mechanics and quantum mechanics.

4. Demonstrate the ability to set up the Schrodinger equation for a given atomic/molecular system.

5. Understand the meaning of wavefunction and how it dictates the properties of given atomic and molecular system.

6. Understand the quantum mechanical principles behind each spectroscopic technique covered in the course.