Chemistry 384 – Introduction to Physical Chemistry II

Instructor Contact Information

Professor Benjamin G. Levine
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215 Chemistry Building

Teaching Assistants:

Karthik Gururangan
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Katy Humphries
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Office Hours

Professor Levine: Monday 10:00-11:00 am and Wednesday 10:00-11:00 am in 215 Chemistry Building or by appointment

Karthik Gururangan: Tuesday 1:00-3:00 pm in 83 Chemistry Building or by appointment

Katy Humphries: Thursday 2:00-4:00 pm in 220 Chemistry Building or by appointment

Meeting Time and Place

Lecture Sessions – Mon, Wed, Fri 3:00-3:50 pm, 101 Biochemistry Building
Discussion Sessions – 001. Monday 11:30 am-12:20 pm, 127 Chemistry Building
002. Tuesday 11:30 am-12:20 pm, 085 Chemistry Building
003. Wednesday 12:40-1:30 pm, 085 Chemistry Building
004. Monday 12:40-1:30 pm, 085 Chemistry Building

Online Resources

This syllabus, the course schedule, and course assignments will be posted on the course website:

http://levinegroup.org/cem-384

Course Content and Objectives

Quantum mechanics is the set of physical laws that describe the motions of very small objects. Many microscopic phenomena in chemistry (chemical bonding, molecular rotations and vibrations) are best explained using these laws. The objective of CEM 384 is to for students to develop a basic understanding of quantum mechanics and how chemical phenomena arise from it. Specifically, students will:

- Develop a basic understanding of how the motions of small objects can be described by a wave function, how the Schrodinger equation is used to predict the wave function, and how properties are computed from the wave function.
- Develop a basic understanding of how quantum mechanics can be applied to describe the motion of electrons around atoms and molecules ("electronic structure").
- Develop a basic understanding of how the electronic structure of molecules determines their interactions with one another.
- Develop a basic understanding of how the interaction of light with matter can be described quantum mechanically and how this interaction can be used to measure the properties of molecules ("molecular spectroscopy").

Course Topics

Lectures will cover the following topics in approximately this order:

- Quantum Theory
- Atomic Structure
- The Chemical Bond
- Molecular Interactions
- Molecular Spectroscopy

Grading Policy

The semester grades will break down as follows:

10% Exam 1
10% Exam 2
10% Exam 3
10% Exam 4
20% Final Exam
40% Homework Assignments

Homework assignments will be made weekly and a subset of the assigned problems will be graded for correctness. Assignments are due at the start of class on the stated due date. Late assignments will be accepted up to one week late. Assignments that are up to 24 hours late will be accepted for 90% credit. Assignments that are late by 24 hours to 7 days will be accepted for 50% credit. After one week, no credit will be given for late work. No late work will be accepted after the date of the final exam. Your lowest two homework grades will be thrown out at the end of the semester.

Absence from an exam due to illness requires a doctor's note.

Grades will be posted at http://cemscores.msu.edu.

Exam Schedule

Exam 1: Wednesday, January 29

Exam 2: Wednesday, February 19

Exam 3: Wednesday, March 25

Exam 4: Wednesday, April 22

Final Exam: Wednesday, April 29, 5:45-7:45 pm in 101 Biochemistry

Collaboration and Plagiarism

Your classmates are excellent resources to learn from. I encourage you to discuss chemistry with each other. However, every student in the class is responsible for doing and understanding their own work in the end. Passing off the work of another as your own is plagiarism and will not be tolerated. Plagiarism may result in failure of the course. If you are in doubt about whether your actions constitute plagiarism, please ask. Additional information about academic dishonesty at MSU can be found at https://www.msu.edu/unit/ombud/dishonestyFAQ.html

Reading Assignments

Readings from the textbook (and possibly outside sources) are intended to prepare you for the lectures, and should be done as scheduled. It is strongly suggested that you also re-read the sections after the lecture.

Email Policy

Except when I note otherwise, I will answer emails related to this class about once per business day, and I cannot guarantee what time that will be. Please plan accordingly by addressing questions to me far enough in advance of the exam/due date that they will be answered in time. Also, please include the phrase "CEM 384" at the beginning of the subject line to make emails related to this course easy to identify.

Course Materials

Elements of Physical Chemistry, 7th editions by Atkins and De Paula.

Notebook and pencil or pen