

Chem 3620, Physical Chemistry II, Winter 2022
1/02/2022

Class Times: TTh 10:00 – 11:50 am

Location: first two weeks of class by zoom using <https://udenver.zoom.us/j/84867122737>

Later in quarter in BAUD 102

Instructor: Sandra S. Eaton

Office Hours by zoom initially or later in the quarter in Olin 202: Tues 8:30 to 9:30 am, Thursday 1:00 to 2:00 pm, or by appointment

Text: *Physical Chemistry, Quantum Chemistry and Spectroscopy*, 4th ed, Thomas Engel,

Tentative Course Outline

Date	Topic	Reading in Engel, 4 th edition
Jan. 4	Why study quantum mechanics (by zoom)	Ch. 1, p. 19 - 32
6	Schrödinger Equation, Wave Functions	Ch. 2, p. 45 - 60
11	Postulates of quantum mechanics	Ch. 3, p. 67 - 73
13	Particle in 1-D box	Ch. 4, p. 77 - 83
18	Particle in 3-D box	Ch. 4, p. 83 - 89
20	Particle in box and the real world	Ch. 5, p. 95 - 104
25	Exam 1 (covers Ch. 1 - 5)	
27	Non-commuting operators, uncertainty principle	Ch. 6, p. 119 - 130
Feb. 1	Harmonic Oscillator, Vibrations	Ch. 7, p. 143 - 154
3	Rotational Motion, angular momentum	Ch. 7, p. 154 - 165
8	Vibrational Spectroscopy	Ch. 8, p. 171 - 184
10	Rotational Spectroscopy	Ch. 8, p. 184 - 190
15	Hydrogen Atom	Ch. 9, p. 209 - 225
17	Exam 2 (Ch. 6 - 9)	
22	Many-electron atoms	Ch. 10, p. 233 - 249
24	Bonding in H ₂ ⁺	Ch. 12, p. 285 - 296
Mar. 1	Diatomic Molecules	Ch. 12, p. 297 - 308
3	Qualitative molecular orbitals	Ch. 13, p. 315 - 340
8	Student Presentations	
10	Student Presentations	
15	Final Exam – cumulative	

Learning goals:

- 1) Understand the principles of quantization
- 2) Apply principles of quantization to rotational and vibrational energy levels and the observation of transitions between these energy levels by spectroscopy
- 3) Apply principles of quantization to molecular orbitals of small molecules

Reading assignments

Reading assignments are intended to prepare you for discussions in class. It is important that you read the material before coming to class and bring questions to class.

DU in-class policies during Covid (may be subject to change)

- Students are required to wear masks at all times during class. If campus alert levels allow, I may not be wearing a mask while lecturing at a distance. Regardless of campus alert

levels, if you would like to speak with me in close quarters (before/after class or in my office), I will wear a mask and request that you also wear a mask.

- To permit contact tracing please sit in the same seat for each class period.
- There can be no eating during class. Drinking is allowed if done with a straw under your mask.

Materials will be posted on Canvas, organized in weekly modules

- This course syllabus, posted as a file.
- Powerpoint file for each class. If you are self-quarantining or isolating please refer to the files on Canvas and, if desired, obtain notes from other students in the class.
- Homework assignments and answer keys
- Sample exams from a prior year
- Exams and Answer keys

Homework

Homework is very important to the learning process. The best way to understand the material for this class is to work problems. There are many additional problems at the end of the chapters in the text. If you have difficulty working an assigned problem it often is useful to try a similar problem in the text.

- There will be a weekly homework assignment posted each Monday on canvas and due the following Sunday at 11:59 pm. Discussing the material with other students in the class is a valuable learning tool and strongly encouraged. However, the assigned homework that you turn in on canvas should be your own work.
- The answers will be posted on Monday morning.
- The homework assignments will be checked for completion and one question will be selected for grading.
- The last half hour of each class will be devoted to answering questions about lecture and homework problems.

Student Presentations

- Select a topic related to the course material that was not covered in class or an end of chapter problem that was not discussed in class or assigned as homework.
- Submit the proposed topic for approval by Feb. 22nd.
- Submit a draft Powerpoint of your 10-min presentation for review by March 1st
- Make presentation to class during week of March 8th

Exams

- Exams will be given during class time. You may have a page of notes with you during each exam. Preparation of this study sheet is a valuable study tool.

Absences from exam

If you are absent for an exam, the grade for your other exam will be weighted more heavily. There will be no makeup exams.

Grading:

Homework- 15%,

Exam 1 - 25%

Exam 2 - 25%

Final Exam - 25%

Presentation - 10%

The grades will be uploaded to Canvas, but the entries will not be weighted so the percentages shown in Canvas will not match the weighted percentages listed above that will be used in calculating grades.