

# Chem 3240, Section 2, Fall 2024

## Introduction to Quantum Mechanics

### Lectures on MWF 12:05-12:55 AM @ Gilman 1810

Instructor: Prof. Davit Potoyan

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#### Learning Objectives and Outcomes:

- **Objectives:** In Chem 324 you will learn how quantum mechanics describes features of nature that classical mechanics cannot by using mathematical and conceptual tools. In addition, you will learn how the quantization of energy is manifested in real-world situations, especially spectroscopy and molecular bonding. You are responsible for learning, understanding, and applying all subjects and concepts listed in this syllabus and presented throughout the course.
- **Prerequisites:** Chem 178, Math 166. Phys 222 recommended. Chemistry 324 is a 3 credit course.

#### Required Materials:

- **Textbook: Quantum Chemistry, 2nd Edition – McQuarrie**, University Science Books, 2008. (ISBN: 9781891389504)
- **Required: a scientific calculator** with the functions:  $\ln(x)$ ,  $e^x$ ,  $10^x$ ,  $y^x$  is essential. Graphing calculators are permitted.
- **Required: Top Hat (Join Code is 777067)**. This course will use the Top Hat response system in class. Iowa State has partnered with Top Hat which give student free access. Just make sure to create account and login.
- **Optional:** Supplementary slides/notes are hosted online at [Course website](#)

#### Attendance:

- **In-class assessments using Top Hat** are part of the grade for the course. Top Hat exercises make up 5% of the final grade. At the end of the semester, a minimum of the lowest 5 Top Hat scores will be dropped. This policy gives students the flexibility to miss up to five classes without impacting their overall grade.

#### Assignments :

- **HW is due on Monday at 11:59 pm.** The only exception is if the Dean of Students Office sends notification that you have a personal emergency. **No credit will be received for late assignments**
- **Submitting HW:** Solutions to HW are submitted on Canvas as a CLEAN and CLEAR PDF. (iPhones have a camera to pdf converter). On Android phones, several free apps are available on GooglePlay (Adobe Scan and Simple Scanner work easily and well). Libraries often have photocopiers with scanning capabilities.
- **Note: Illegible exams or problem sets will NOT be graded.** Photo submissions of problem sets will not be graded (problem sets must be submitted as legible PDFs). All work must be presented reasonably, neatly, and logically; all work MUST be shown. **A correct answer without supporting work will receive a score of 0.** Solutions to problem sets MUST be listed in the order given on the assignment.

#### Exams:

- **Three 50 minute exams\* each worth 20% and a *comprehensive* final exam worth 20% of the final grade.**
- **Exam 1: Sep 27 (likely to cover Chapters 1 – 4, MathChapters A, B, & C)**
- **Exam 2: Oct 30 (likely to cover Chapters 5 – 7, MathChapters D, E, & F)**
- **Exam 3: Dec 2 (likely to cover Chapters 8 – 12)**
- **Final Exam: Section 1 TBD**

#### Grading:

- **15 % from HW solutions** (lowest 3 dropped at the end)
- **5 % from in-class Top Hat quiz** (score above 75% converted to 100, 60-74% converted to 80%)
- **20 % from each of the three midterm exams + 20% from the final exam.** (the final score replaces one of the lowest midterms)
- Grades are based upon [default percentages calculated by Canvas](#) **NO curving is implemented in this class**

#### Canvas:

- Canvas will be central to disseminate information (such as lectures and problem sets) and announcements for the class. Canvas will also be used to post supplementary information that can help with understanding the concepts of the course.

#### Communication:

- We strongly encourage students to post on the **discussion board on Canvas** when asking subject related questions. This way the whole class will be engaged and can benefit from the answer. If you send an individual email then please put **Chem 324:** at the beginning of the subject. This will help the instructor and TA see your questions in their mailboxes and to put a priority on answering these e-mails.

#### ISU final examinations policy

- Exam policy will be followed [absolutely](#). Students who have three or more finals on the same calendar day may request to reschedule a final. The instructor of the course having the smallest number of students is responsible for arranging an alternate examination time for the student unless make-up exam times are available in one of the other courses. Alternative final exam times will only be scheduled for students with a conflicting final exam time or those with three or more finals scheduled for the same days as listed above (and with Chem 324 as their smallest course). There will be no exceptions. **The deadline to request an alternative time for the final exam is 11 am on Friday Dec 2 at 1 pm.**

#### **Make-up exams will be administered only in exceptional cases**

- Must be discussed with the instructor and which **absolutely require documentation**. In some cases, at the instructor's discretion, in lieu of a make-up exam, the final grade may be comprised of the remaining requirements, each taking on a proportionally higher weighting. **All students (including graduating seniors) MUST take the final exam.**

#### **Regrades on exams or homework assignments:**

- Students have a deadline of **2 weeks** following an exam or homework assignment to request a regrade. Regrade requests must be limited to the correction of errors in grading. After 2 weeks, scores are set.

#### **Illness or emergencies:**

- If you have a health issue or emergency that requires you to miss multiple classes, you are advised to contact the Dean of Students Office (<http://www.dso.iastate.edu/sa>) and your academic adviser to keep them informed of your situation.

#### **SYLLABUS STATEMENTS ON SAFETY, BEHAVIOR, RESPECT, AND UNIVERSITY POLICIES**

##### **• Public health**

- If you are not feeling well, you should stay home and focus on your health. Should you miss class due to illness, it is your responsibility to work with your instructor to arrange for accommodations and to make up coursework, as consistent with the instructor's attendance policy.
- You may choose to wear a face mask and/or receive the COVID-19 vaccine and boosters, as well as other vaccines such as influenza, but those options are not required. Thielen Student Health Center will continue to provide COVID-19 vaccinations free-of-charge to students. The university will continue to offer free masks and COVID-19 test kits during the fall 2022 semester. Other wellbeing resources for students are available [here](#)
- **Public health information for the campus community continues to be available on Iowa State's public health website. All public health questions should be directed to [publichealthteam@iastate.edu](mailto:publichealthteam@iastate.edu)**

#### **Right to Privacy:**

- The Federal Right-to-Privacy Act (FERPA) prohibits the instructor from public disclosure of exam scores. You may obtain your exam scores in person from your TAs or the course instructor or using the online grade book. The instructor and the TAs are prohibited from giving grades over the phone or e-mail. Instructors and TAs are not permitted to discuss a student's academic performance with anyone other than the student, their academic adviser, or ISU staff or faculty who have need of this information; Faculty, including TAs, may not discuss academic performance with a student's relatives, friends, or potential employers.

### **Academic Dishonesty**

- The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office (<https://www.studentconduct.dso.iastate.edu/academic-misconduct>).

### **Accessibility Statement**

- Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester.
- Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at [www.sas.dso.iastate.edu](http://www.sas.dso.iastate.edu), by contacting SAS staff by email at [accessibility@iastate.edu](mailto:accessibility@iastate.edu), or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building. Students with academic accommodations MUST communicate with the course instructor.

### **Usability, disability and design:**

- I am committed to creating a course that is inclusive in its design. If you encounter barriers, please let me know immediately so that we can determine if there is a design adjustment that can be made or if an accommodation might be needed to overcome the limitations of the design. I am always happy to consider creative solutions as long as they do not compromise the intent of the assessment or learning activity. You are also welcome to contact the Student Accessibility Services (515-294- 7220) to begin this conversation or to establish accommodations for this or other courses. I welcome feedback that will assist me in improving the usability and experience for all students.

### **Prep Week**

- This class follows the Iowa State University Prep Week policy as noted in section 10.6.4 of the Faculty Handbook, (<https://www.provost.iastate.edu/faculty-and-staff-resources/faculty-handbook>).

### **Discrimination and Harassment**

- Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email [eooffice@iastate.edu](mailto:eooffice@iastate.edu).

### **Classroom etiquette:**

- It is expected that you will respect your fellow students and the instructor during the class. People who read newspapers, carry on extended conversations during class, or engage in other distracting behavior, will be asked to leave.

### **Mutual respect and professionalism:**

- You are expected to treat your instructor and all other participants in the course with courtesy and respect. Your comments to others should be factual, constructive, and free from harassing statements. You are encouraged to disagree with other students, but such disagreements need to be based upon facts and documentation (rather than prejudices and personalities). It is the instructor's goal to promote an atmosphere of mutual respect in the classroom. Please contact the instructor if you have suggestions for improving the classroom environment. It is preferable if students discuss issues directly with the instructor, however, students may also leave a note in the instructor's mailbox.

### **Name, gender identity and/or gender expression:**

- Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me accordingly early in the semester so that I may make appropriate changes to my records.

### **Religious Accommodation**

- Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request the reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the Dean of Students Office (<https://www.studentassistance.dso.iastate.edu/>) at 515-294-1020 or the Office of Equal Opportunity, (<https://www.eoc.iastate.edu/>) at 515-294-7612.

### **Free Expression**

- Iowa State University supports and upholds the First Amendment protection of freedom of speech and the principle of academic freedom in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

### **Promoting student health and wellness:**

- Iowa State University is committed to proactively facilitating the well-being of all students. We welcome and encourage students to contact the following on-campus services for assistance regarding their physical, intellectual, occupational, spiritual, environmental, financial, social, and/or emotional needs:
  - Student Wellness call (515) 294-1099 or via the website (<http://studentwellness.iastate.edu>);
  - Thielen Student Health Center call (515) 294-5801 (24/7 Medical Advice) or via the website (<http://www.cyclonehealth.org>);
  - Student Counseling Services call (515) 294-5056 or via the website (<https://counseling.iastate.edu>);
  - Recreation Services call (515) 294-4980 or via the website (<http://recservices.iastate.edu>).
  - Students dealing with heightened feelings of sadness or hopelessness, thoughts of harm or suicide, or increased anxiety may contact the ISU Crisis Text Line (Text ISU to 741-741) or contact the ISU Police Department (515) 294- 4428.

### **Contact Information for Academic Issues**

- If you are experiencing, or have experienced, a problem with any of the above issues, email [academicissues@iastate.edu](mailto:academicissues@iastate.edu) (This email address for contact information is monitored and answered through the Office of the Senior Vice President and Provost.)