

**SYLLABUS (DRAFT 9/20/21)**  
**Ch21a. Physical Chemistry**  
**Quantum Chemistry**  
**Fall 2021**

**Instructor:** Mitchio Okumura [mo@caltech.edu](mailto:mo@caltech.edu)  
**Assistant:** Elisha Jung-Okawa [ejung@caltech.edu](mailto:ejung@caltech.edu)

**LOCATION:** 147 Noyes  
MWF 1-2pm PST + discussion section (tbd).

First Day of Class: Monday, September 27

**TAs:**  
Termeh Bashiri [tbashiri@caltech.edu](mailto:tbashiri@caltech.edu)  
Bo Li [bli3@caltech.edu](mailto:bli3@caltech.edu)

**Required Texts:**

1. Donald McQuarrie, **Quantum Chemistry**, 2<sup>nd</sup> ed. University Science Books.
2. Either:  
Fleisch, **Students Guide to the Schrodinger's Equation**, Cambridge University Press, 2020.  
or  
David J. Griffiths, **Introduction to Quantum Mechanics**, Prentice Hall, (any edition).

**Recommended Texts:**

Ira Levine, **Quantum Chemistry**, Prentice Hall (any edition).

**COURSE GOALS**

This course will introduce fundamental concepts in quantum mechanics, and the application of quantum mechanics to chemistry.

**Requirements:**

approx 7 problem sets	40%
first midterm	30%
second midterm	30%

**Late Policy:** 5% per day, no credit after one week.  
Weekend counts as 1 day.

Extensions from Professor ONLY

**Prerequisites:**      **\*see Instructor for permission if you do not meet these**  
Ch1ab, Ph1 and Ph2a, Ma1 and Ma2 or equivalents (linear algebra, matrices, vector calculus, differential equations), and Ch41abc, or taken concurrently.

***Students who have had more advanced preparation in quantum mechanics (e.g. Ph2b, Ph12b) DO NOT NEED TO/SHOULD NOT TAKE THIS COURSE. They will receive credit for meeting option requirements. Contact Registrar.***

**Homework:**

DO NOT USE

- Previous years Ch21a Homework solutions or Exams
- The Solution Guide for this or other McQuarrie authored texts

You can use any other resources.

Wellness Policy

**Reasonable accommodations will be made. Please contact the Instructor for extensions or other requests.**

- I want to clearly state that taking care of your health and well-being should be your number one priority. You cannot learn if you are unwell or under extreme duress.
- The course work should feel challenging in a positive way, but I do not want you to be overwhelmed by your work for this course.
- If you find yourself overwhelmed or encountering other personal challenges during the term, please reach out to me so we can develop a plan for you to pursue success in this course in a healthy way. In addition, I encourage you to utilize Caltech's resources.
- I am available to chat, and you can always attend office hours for a non-academic conversation if necessary. You can also visit the counseling center or talk to a Dean if you find you need help beyond the course staff.
- Diversity, inclusion, and belonging are all core values of this course. All participants in this course must be treated with respect by others in accordance with the honor code. If you feel unwelcome or unsafe in any way, no matter how minor, I encourage you to talk to me or one of the Deans.

\*Special thanks to Susanne Hall, Adam Blank and Claire Ralph for sharing their policies, which have been adapted for this template.

If you would like to ask about flexibility with coursework for a temporary or minor wellness issue, please contact [insert course personnel: e.g., instructor, TA, head TA] directly. The Deans' Office, Student Wellness Services (SWS) and Caltech Accessibility Services for Students (CASS) are available to help you with illness and health conditions that may impact your coursework:

- [Student Wellness Services](#) will assess and treat illnesses and medical conditions, and communicate (with student's permission) with the Deans' Office if needed. CASS, part of SWS, can recommend and provide for accommodations needed due to temporary or long-term disabilities. Policies about academic extensions for medical reasons can be found [here](#).
- [The Deans' Office](#) may recommend academic exceptions in cases of significant family or personal emergencies, or moderate to severe illness or medical conditions that make it difficult to keep up with coursework. Please reach out to a Dean as soon as possible if you experience these conditions.

### Students with Documented Disabilities

*You may choose to make a statement here about your intent for the course to be accessible to all students and/or your hope to hear from students as early in the term as possible. At a minimum, please include the following text:*

Students who may need an academic accommodation based on the impact of a disability must initiate the request with Caltech Accessibility Services for Students (CASS). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact CASS as soon as possible, since timely notice is needed to coordinate accommodations. For more information: <http://cass.caltech.edu/>, [cass@caltech.edu](mailto:cass@caltech.edu).

### Academic Integrity

Please find a guide for preventing and responding to plagiarism for faculty here:

<http://writing.caltech.edu/faculty/plagiarism>

Caltech's Honor Code: "No member of the Caltech community shall take unfair advantage of any other member of the Caltech community."

Understanding and Avoiding Plagiarism: Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit, and it violates the honor code in a fundamental way. You can find more information at: <http://writing.caltech.edu/resources/plagiarism>.

All instances of plagiarism or other academic misconduct will be referred to the [Board of Control \(undergraduates\)](#) or [Graduate Honor Council \(graduate students\)](#) for review.

### Collaboration Policy

Collaboration on homework assignments is encouraged. You may consult outside reference materials, other students, the TA, or the instructor, but you cannot consult homework solutions from prior years and you must cite any use of material from outside references. All solutions that are handed in should be written up individually and should reflect your own understanding of the subject matter at the time of writing. Python or MATLAB scripts and plots are considered part of your write-up and should be done individually (you can share ideas, but not code). No collaboration is allowed on the midterm or final exams.

### My Status as a “Responsible Employee”

As a faculty member, I am required to notify the Institute’s Equity and Title IX Office when I become aware of discrimination, sexual harassment, or sex- or gender-based misconduct involving our community members. If one of my students shares such an experience with me, I can help connect them to support resources but will not be able to keep that information confidential as part of fulfilling my responsibility to make sure my students are offered the opportunity to access information and support by the Institute. For more information, you can email [equity@caltech.edu](mailto:equity@caltech.edu), go to [equity.caltech.edu](http://equity.caltech.edu), or review the Institute’s [Sex- and Gender-Based Misconduct Policy](#).

If you have experienced such prohibited conduct and would like confidential support, please feel to contact Student Wellness Services [626-395-8331; <https://wellness.caltech.edu/counseling>]; Taso Dimitriadis, Center for Inclusion and Diversity [626-395-8108; [taso@caltech.edu](mailto:taso@caltech.edu)]; or Teresa Mejia, Campus Sexual Violence Advocate [626-395-4770; [teresam@caltech.edu](mailto:teresam@caltech.edu)].

### Academic Resources for Students

- **Online Learning:** Resources, FAQs, and more for students learning online; <http://learn.caltech.edu>
- **Tutoring:** The undergraduate dean’s office provides a peer tutoring service; If the course isn’t listed, students can talk with the dean’s office to arrange for a tutor; <http://deans.caltech.edu/>
- **Writing:** The Hixon Writing Center provides professional writing tutors as well as peer tutors, individual and group writing space, and additional resources; <http://writing.caltech.edu>
- **Registrar & FERPA:** The registrar can answer questions about degree progress, privacy of student records, and course enrollment procedures; <http://registrar.caltech.edu>. The website also lists *Option Representatives* for option-specific advising, policies, and information.
- **Library:** Borrow books, retrieve journal articles, receive guidance about research; <https://www.library.caltech.edu/>
- **Dean of Undergraduate Students:** Wide-ranging assistance addressing issues (academic and other) for undergraduates; <http://deans.caltech.edu>

- **Dean of Graduate Studies:** Wide-ranging assistance addressing issues (academic and other) for graduate students; <http://gradoffice.caltech.edu>

### *Additional Resources for Students*

- **Student Wellness Center:** Wide variety of health and wellbeing services; <https://wellness.caltech.edu/>
- **Counseling Services:** Free for all students, regardless of insurance plan; <http://counseling.caltech.edu>
- **Occupational Therapy:** Individual sessions and consultations on building healthy habits and routines, time management, planning and organization, and more. Free for all students; <http://ot.caltech.edu>
- **Center for Inclusion and Diversity:** Resources concerning navigating diversity and inclusion, including staff who can speak with students about challenges of harassment and discrimination; <http://diversitycenter.caltech.edu>
- **Title IX:** Caltech's Title IX Coordinator ([titleix@caltech.edu](mailto:titleix@caltech.edu)) works with students on issues related to sexual harassment, sexual misconduct, and sex discrimination; <http://titleix.caltech.edu/>
- **Caltech Accessibility Services for Students:** The Accessibility Services Specialist works with students with temporary medical conditions, or mental, physical or learning disabilities on accommodation requests and services; <http://cass.caltech.edu>
- **Residential Support:** Resident Associates (RAs) and Residential Life Coordinators (RLCs) are also resources for TAs and students; <http://www.residentialexperience.caltech.edu/>
- **Career Development Center:** Provides resources to help students make career decisions and implement career plans; <http://www.career.caltech.edu>