

CHM 1478H: Quantum Mechanics for Physical Chemists

Course Syllabus Fall 2020

I CONTACTS

INSTRUCTOR

Name: Paul Brumer

Email: paul.brumer@utoronto.ca

Office: Lash Miller, Room 421B

Classes: On line using Zoom (to be recorded). Mondays 4:00 to 6:00 PM. See zoom information at the end of this syllabus.

TEACHING ASSISTANTS

There are no tutorials or TA's for this class. We will discuss approaches to interactions between class participants during the first lecture.

II COURSE OVERVIEW

COURSE DESCRIPTION:

Classes a systematic approach to formal quantum mechanics.

STUDENT LEARNING OUTCOMES:

By the end of this course, students will have learned:

- Fundamental quantum mechanics formulated in Hilbert space. This includes representation theory, principles of symmetry, the interrelationship between Heisenberg and Schrödinger pictures, an introduction to density matrices. Conceptual issues in measurement theory, entanglement, etc

BACKGROUND PREPARATION:

CHM 326H. Also, a background knowledge in linear algebra, e.g., MAT 223H and MAT 224H would be helpful.

READINGS:

Required: *Quantum Mechanics* by Albert Messiah, Dover Publications.

III HOW THE COURSE IS ORGANIZED

Lecture notes will be posted on Quercus and used as the basis for detailed discussion during the course lectures. Students will need to have access to the notes during the lectures.

Homework problems will be assigned every-other-week, and will be graded.

The following is a *rough* schedule:

The first three hours of lectures: Time-dependent quantum mechanics (Tannor's book, Chapters 1-3).

Remainder of lectures: Material in Messiah's book Chapters V, VII, VIII, but with assorted perspectives introduced during the lectures.

IV EVALUATION/GRADING SCHEME

- Biweekly problem sets: worth 40% of final mark
- Term paper: worth 30% of final mark. Due prior to final assessment period. Content to be discussed during lecture hours.
- Final assessment: to be held during final assessment period in December 2020, worth 30% of final mark.

Note: if an unexpected technical issue occurs with a university system (e.g., Quercus services, network outage) that affects availability or functionality, it may be necessary to revise the timing or weighting of the assessments.

V COURSE POLICIES

- The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.
- All work for the course must be submitted using Quercus.
- Normal University procedures should be followed to signal course absences and request make-up tests or exemptions from exams.

VI TECHNOLOGY REQUIREMENTS

This course requires the use of computers, and of course sometimes things can go wrong when using them. You are responsible for ensuring that you maintain regular backup copies of your files, use antivirus software (if using your own computer), and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, broken printers, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and are not acceptable grounds for a deadline extension.

VII INSTITUTIONAL POLICIES AND SUPPORT

ACADEMIC INTEGRITY

On Academic Integrity:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <https://www.academicintegrity.utoronto.ca/>).

COPYRIGHT

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session.

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor.

ACCESSIBILITY NEEDS

Students with diverse learning styles and needs are welcome in this course. The University of

Toronto is committed to accessibility: if you require accommodations for a disability, or have any other accessibility concerns about the course, please contact [Accessibility Services](#) as soon as possible.

ADDITIONAL SERVICES and SUPPORT

The following are some important links to help you with academic and/or technical service and support

- General student services and resources at [Student Life](#)
- Full library service through [University of Toronto Libraries](#)
- Resources on conducting online research through [University Libraries Research](#)
- Resources on academic support from the [Academic Success Centre](#)
- Learner support at the [Writing Centre](#)
- Information for [Technical Support/Quercus Support](#)

NOTE:

If you are a citizen of another country, and/or accessing your courses at the University of Toronto from a jurisdiction outside of Canada, please note that you may be subject to the laws of the country in which you are residing, or any country of which you have citizenship. The University of Toronto has a long-established commitment to freedom of expression, with this right enabled by an environment valuing respect, diversity, and inclusion. In your classes, you may be assigned readings, or discuss topics that are against the law in other jurisdictions. We encourage you to become familiar with any local laws that may apply to you and any potential impact on you if course content and information could be considered illegal, controversial, or politically sensitive. If you have any concerns about these issues, please contact your instructor directly to discuss with them.

CHM423/CHM1478 ZOOM INFORMATION

Zoom Information for lectures, is below. However, there will be no lectures on September 28, or on Thanksgiving, which is October 12.

Paul Brumer is inviting you to a scheduled Zoom meeting.

Topic: CHM423/CHM1478

Time: Sep 14, 2020 16:00 Eastern Time (US and Canada)

Every week on Mon, until Dec 14, 2020, 14 occurrence(s)

Sep 14, 2020 16:00

Sep 21, 2020 16:00

Sep 28, 2020 16:00

Oct 5, 2020 16:00

Oct 12, 2020 16:00

Oct 19, 2020 16:00

Oct 26, 2020 16:00

Nov 2, 2020 16:00

Nov 9, 2020 16:00

Nov 16, 2020 16:00

Nov 23, 2020 16:00

Nov 30, 2020 16:00

Dec 7, 2020 16:00

Dec 14, 2020 16:00

Please download and import the following iCalendar (.ics) files to your calendar system.

Weekly:

<https://utoronto.zoom.us/meeting/tJEofuGrqDoqGdyOdFwBIr5kekE10DUsWNfE/ics?icsToken=98tyKuCtqzliGdKUsBqPRowMGYr4Wenwpm5fjadEsxvDFAJ6cFb9M-lnY-JbJcvn>

Join Zoom Meeting

<https://utoronto.zoom.us/j/95598361038>

Meeting ID: 955 9836 1038

Passcode: 940029

One tap mobile**+14388097799,,95598361038#,,,,,0#,,940029# Canada****+15873281099,,95598361038#,,,,,0#,,940029# Canada****Dial by your location****+1 438 809 7799 Canada****+1 587 328 1099 Canada****+1 613 209 3054 Canada****+1 647 374 4685 Canada****+1 647 558 0588 Canada****+1 778 907 2071 Canada****Meeting ID: 955 9836 1038****Passcode: 940029****Find your local number: <https://utoronto.zoom.us/j/95598361038>****Join by SIP****95598361038@zoomcrc.com****Join by H.323****162.255.37.11 (US West)****162.255.36.11 (US East)****69.174.57.160 (Canada)****Meeting ID: 955 9836 1038****Passcode: 940029****Join by Skype for Business****<https://utoronto.zoom.us/j/95598361038>**