

**Course:** CHMB21H3S, Chemical Structure and Spectroscopy

**Instructor:** Prof. Artur F. Izmaylov [artur.izmaylov@utoronto.ca](mailto:artur.izmaylov@utoronto.ca)

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Please use only UofT email accounts. When composing your email, please use professional language. Be sure to include the course code as part of the subject line and sign the email with your first and last name, as well as your student ID. Your email will be answered as soon as possible.

**Web:** CHMB21 maintains a Blackboard web space which archives a variety of course-related information including: grades, class announcements, lecture and lab materials, contact information and links to outside resources. In addition, class emails will periodically be sent via Blackboard. To receive these emails, you must have a valid “utoronto.ca” email account registered with ROSI.

**Lectures:** AA205 Monday 15:00–17:00, AA205 Wednesday 15:00–16:00

**Labs:** They will start after the reading week and will be held in BV498 on Monday 13:00–15:00

**Office Hours:** EV356, Wednesday 13:00–14:00, or any other day by appointment.

**Recommended Texts:** D. A. McQuarrie, Quantum Chemistry; T. Engel Quantum Chemistry and Spectroscopy 3rd edition or T. Engel and P. Reid, Physical Chemistry 2nd edition.

**Marking Scheme:** Home works 20%, Midterm Exam 30%, Final Exam 35%, Labs 15%. **To pass this course** you need to pass either the midterm test or the final exam, and to receive a final grade of 50+.

**Note:** It is desirable that you take MATA23 and MATB41H3. You will need to take it if you are going to take a 3rd year physical chemistry course.

**Course Description:** This course uses quantum mechanics extensively to describe atomic and molecular structure and bonding, including valence bond and molecular orbital theory. The theory of these systems will be treated first and their spectroscopy afterwards. The list of topics is as follows.

- Motivation for quantum mechanics, Schrödinger equation, quantum postulates and formalism
- Quantum mechanics of simple systems: particle in a box, harmonic oscillator, rigid rotor, hydrogen-like atoms; angular momentum operator
- Electron spin, many electron atoms
- Theories of chemical bonding: valence bond theory and molecular orbital theory

- Quantum mechanics of the internal motion of molecules; spectroscopy of the atomic and molecular systems

### **Midterm:**

There will be a 2-hour mid-term test written during one of the classes after Reading Week. If you miss the mid-term due to a legitimate reason, you must submit appropriate documentation *within one week of your absence*. If the reason is medical, an official UTSC medical form should be downloaded from the Registrar's website [http://www.utsc.utoronto.ca/~registrar/resources/pdf\\_general/UTSCmedicalcertificate.pdf](http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf) and completed by your physician. Students with a validated absence will be permitted to write a make-up exam. ***If no acceptable documentation is received, you will receive a grade of zero for that test.***

### **Final Examination:**

There will be a 2-hour, ***cumulative*** exam written during the end of semester exam period. The exact date, time and location will be announced as soon as they are available.

***Please note that if you miss the Final Exam, you must petition the Registrar's Office to write a make-up exam in the next formal exam period.*** e.g. for a missed April Final Exam, the make-up Exam is in August. Your documentation is crucial for a successful petition and must be submitted by the last day of the exam period. Check the UTSC Calendar for instructions and deadlines.

### **Labs:**

The laboratory component of CHMB21 is compulsory. In order to pass the course, you must also to pass the lab component. Attendance at all labs is expected. Attendance is taken in labs. If you need to miss a laboratory period for any *valid* reason, you must contact the lab TA, Rami Gherib, by e-mail *before* your next scheduled lab period. If the reason for your absence is medical, you must download a UTSC Medical Certificate and have it completed by your doctor (download at:

[http://www.utsc.utoronto.ca/~registrar/resources/pdf\\_general/UTSCmedicalcertificate.pdf](http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf)

The completed note must contain the following information:

- Verification that you were examined on or before the day of your missed lab
- The nature of your illness
- A statement indicating the physician's professional opinion as to whether you should receive special consideration on medical grounds

Submit your completed medical note to Mr. Rami Gherib within one week of your absence. The make-up lab will be arranged with your TA.

The lab manual will be available for download from the course page on Blackboard.

### **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 ([www.governingcouncil.utoronto.ca/policies/behaveac.htm](http://www.governingcouncil.utoronto.ca/policies/behaveac.htm)) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and 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, including (but not limited to) doctor's notes.

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 [www.utoronto.ca/academicintegrity/resourcesforstudents.html](http://www.utoronto.ca/academicintegrity/resourcesforstudents.html)).

### **On Accommodation:**

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the

University's courses and programs.

For more information on services and resources available to instructors and students, please contact Tanya Lewis, Director, Academic Skills and Accessibility Services at 416-978-6786; [tanya.lewis@utoronto.ca](mailto:tanya.lewis@utoronto.ca).