

Course: CHMB21H3S, Chemical Structure and Spectroscopy

Instructor: Prof. Artur F. Izmaylov

Email: artur.izmaylov@utoronto.ca

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: BV264, Monday 15:00–17:00, Wednesday 15:00–16:00

Office Hours: SW504D, Wednesdays 16:00–17:00, Fridays by appointment

Recommended Texts: 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 35%, Final Exam 45%

Note: It is desirable that you take 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